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Volume XIV Number 2

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The Myopathies

Benjamin Boshes, M. D.*

By the term "myopathy," we mean a disease of muscle. It is important, in understanding these affections, to differentiate the myopathies due to neurologic disease from those due to non-neurologic disease, as far as we know. In the former group there is definite evidence of pathological change in the central nervous system, while in the latter we can demonstrate no pathology by our present methods.

Among the true neural atrophies we may mention first, progressive spinal amyothrophy of the Aran-Duchenne type. This is a disease which begins in middle life—heredity is no factor. The symptoms manifest themselves insidiously, and usually begin in the small hand-muscles. The patient gradually develops a "monkey hand." Fibrillary twitchings occur, and a reaction of degeneration sets in. The tendon reflexes become diminished. There is no pain associated. The process jumps from muscle to muscle. It may start elsewhere than in the hands, and one may see deltoid and scapular involvement. Life becomes endangered when the patient develops a bulbar paralysis, or when the muscles of respiration become involved.

In differentiating this disease, one must rule out chronic anterior poliomyelitis which some men claim is not a clinical entity, but a progressive spinal atrophy. There is a previous history of anterior poliomyelitis, but the affection locks like a spinal atrophy, and interestingly enough, the lesions in the anterior columns of the cord are identical with those of Aran-Duchenne's type. There is no evidence of an infectious process. Amyotrophic lateral sclerosis begins like a spinal atrophy, but some evidence of pyramidal tract disease manifests itself, and spasticity occurs below the level of the lesion. Pathological reflexes may be elicited in the area of cortico-spinal tract involvement. Arthritic atrophy due to a pathological joint nearby must also be ruled out.

The lesion in progressive spinal amyothrophy is in the anterior horn cell which shows degenerative arthritic change.

The essence of treatment in this disease is rest. Fatigue must be avoided and any exercise must be done gently, all efforts ceasing well within the borders of fatigue. Arsenic treatment is advised by some. Others advocate electricity, galvanic or faradic; but stimulation must be done gently.

For completion one may mention the hereditary or infantile type of progressive muscular atrophy (Werdnig-Hoffmann-Bruns). It attacks several members of one family, usually at the end of the first year of life. Atrophies ensue, and the disease is generally fatal in two to five years. Again one sees a degeneration of the anterior horn cells.

The Neuritic type of progressive muscular atrophy is named after those who first described it—the Charcot-Tooth-Marie type. Several members of one family may be afflicted. The muscles of the foot atrophy, the peronei, and the extensor communis. A club-foot develops, and finally the foot hangs like a bag. Years later the upper extremities become involved; a claw hand develops, fibrillary tremors are present, and a partial reaction of degeneration may be demonstrated. In a few cases, pain, hyperesthesia, and motor changes may occur. A lesion in the nerves may be demonstrated in some cases, and writers have described this disease as the "hereditary form of multiple neuritis."

The muscular dystrophies are a different set of diseases from the true neural atrophies. The dystrophies were described by many in the different forms, but to Erb goes the credit of showing that all the types belong to a common group. The primary myopathies differ from progressive spinal atrophy in that in the former the onset is at an early age, heredity is an important factor, the proximal musculature is involved rather than the distal, and in one case, atrophy, true hypertrophy, and pseudo-hypertrophy may occur simultaneously. There is generally no reaction of degeneration.

The dystrophy may begin in childhood, at puberty, or during adolescence. Several members of a family may be affected, and the disease may be followed back through several generations, especially through the mother.

The symptoms develop slowly and may be unnoticed for a long time. There is usually an early involvement of the pelvis, thighs, and the erector spinae so that the patient walks with a "waddling gait." He has difficulty in climbing stairs and falls easily. If the child tries to rise from a supine position, he turns over on his abdomen, raises his trunk to a kneeling position, and lifts his knees from the ground. Then he places one hand on the knee of the same side, and either rises with a jerk or climbs up on himself hand over hand. This "climbing," while occurring most frequently in the dystrophies, is also seen in patients with painful backs. The muscles of the shoulders become mobile, and when the child is lifted at the axillae, he "falls through." The scapulae become winged. The muscles of the face become involved, especially the orbicularis oris which becomes enlarged so that the lips protrude to give the patient a "taper face."

Some muscles become atrophic, especially the pectoralis major (sternal portion), and the trapezius. Others become hypertrophic—the infraspinati, deltoids, triceps, sartorius, glutei, and especially the calf muscles. The hypertrophy may be real or spurious. Contractures of the Achilles Tendons may develop. Rarely, if ever, is there a reaction of degeneration. The illness may extend over a period of thirty to forty years.

Read before the Chicago Chapter.

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There is no demonstrable lesion in the central or peripheral nervous system. The fibers of the affected muscles may be atrophic, hypertrophic, or there may be considerable fat and connective tissue laid down.

The disease may be subdivided into several types. The juvenile form occurs in youth or middle age. It affects the shoulder girdle chiefly. The pseudo-hypertrophic type is seen in earliest childhood. Males are especially affected. The pelvic, thigh, and calf muscles become hypertrophied, while the muscles of the upper part of the body become atrophic. In the infantile form, facial, scapular, and humeral muscles are involved to give the so-called Landouzy-Dejerine type. The hereditary type is like the pseudo-hypertrophic, except that there is no hypertrophy. Children eight to ten years of age are affected. Of these four groups, patients with the juvenile form have the best prognosis.

These patients have been treated in many different ways: endocrine therapy, carbohydrate feedings, adrenalin, pilocarpin injections, etc., with no particular improvement. The basis of the recent glycin therapy is the finding of a diminished creatinin and an abnormal excretion of creatin in the urine. It was learned that glycin—the simple amino acid glycocoll—caused an increase in creatin output, and therefore, might be a factor in creatinin—creatin metabolism which is the essential protein metabolism of muscle. Some men reported good results with glycin, others reported rather indifferent results. We repeated the study of glycin in six cases of muscular dystrophy by measuring their strength changes on a spring scale dynamometer:

Two cases were very far advanced and never became improved. Three cases have been studied for twenty-one months. Of these latter, two are improved as indicated by an increase in strength measured clinically and on the spring scale dynamometer. They were moderately advanced cases of the pseudo-hypertrophic type. The third was a marked pseudo-hypertrophic type with an endocrine disturbance. He was very obese, with tiny genitalia, and looked like a case of Froelick's syndrome. While he gained strength in general during the period of study, he was clinically weaker. He lost strength in his leg muscles, and what was more important, had gained more pounds in weight than he had in strength—twenty-six pounds in fourteen months. The sixth case has been studied for four months. He has shown a very rapid increase in strength, gaining almost three and a half pounds in strength per muscle group in fifty-six such groups. He was a rather early case, and to date has been our best result. These children were permitted to exercise, but within the point of onset of fatigue.

When glycin was stopped in any of the cases which improved, there was an immediate drop in strength. An upper respiratory infection, vaccination, or protracted diarrhea may dissipate much of the gain in strength.

For the sake of completion, one should mention myasthenia gravis, a disease of the third decade of life and thereafter, even though sometimes it is seen earlier. Here the musculature supplied by the cranial nerves is first affected but later the somatic skeletal musculature becomes involved. The patient tires in any given movement and if this is repeated, shows the so-called "myathenic reaction," and recovers after a short rest. He is strong in the morning but rapidly "wears out." He can chew at the beginning of the meal, but toward the end may have difficulty in swallowing liquids. Rest results in partial recovery.

Little was done for these patients until recently it was discovered that ephedrin and glycin were beneficial in this disease, especially in combination. The best results with glycin have been reported in myasthenia gravis which also shows a disturbance in creatinin—creatin metabolism.

Just what the value of glycin is in the dystrophies and in myasthenia gravis is hard to say. Sufficient time has not elapsed to enable one to state definitely what it will do over a long period. The fact that moderately advanced cases while on glycin therapy show no advance and in reality are stronger, is significant, especially in so progressive a disease. It offers a hopeful outlook that further studies in metabolism in the myopathies may reveal new factors which may be corrected.

Present Day Surgical and Psychological Treatment of Orthopaedic Surgery Cases

J. T. Hodgen, M. D. *

In order to gain a proper perspective in the handling of the handicapped individual, we must turn back to the parchments of history or to the ones who have made the present possible. What is history? It is that branch of knowledge which records and explains past events as steps in human progress, or it is the study of the character and significance of events. Without history a man's soul is blind—he sees only the things which touch his nose.

We shall mention but four names written large upon the tablets of the immortals: Lord Lister, Louis Pasteur, Sir Willliam Osler, and Robert W. Lovett. Before the advent of Lord Lister and Louis Pasteur, the meticulous elective surgery so necessary in bone and joint cases could not have been attempted without dire consequences. Sir William Osler and Robert W. Lovett added to or superinduced upon the art or practice of medicine that God-given gift which I shall call personality attraction. He who runs may read and I care not whether one believes in Shintoism, Buddhism, Mohammedanism, or any -ism, a close study will reveal the fact that only in Christianity is the love of one's fellow-man made the major premise. Both of these latter men lived their religion, and "the art of arts is the guidance of the soul" may be applied to them without fear of undue praise or gross sentimentality.

Had it not been for these four men medicine and that branch of surgery known as Orthopaedic Surgery could not have reached the parnassus of modern day efficiency. In other words, we should still be in the valleys instead of upon the mountain sides. To the French chemist, Louis Pasteur and to his genius, we owe the bacteriological basis of antiseptic and later aseptic surgery. Before Pasteur there was Egyptian darkness, but

Read before the St. Louis Medical Society.
*Grand Rapids, Mich.

with his advent there came a light that brightens more and more as the years give us ever fuller knowledge and wisdom. His was one of those few supremely original minds which have given direction to human life and which touch the daily existence of untold millions of living things.

The facts that fevers were catching, that epidemics spread, that infections could remain attached to particles of clothing, and so on, gave support to the view that the actual cause was something alive. It was really a very old view, the germs of which may be found in the Fathers, but which was first clearly expressed so far as we know by Frascastorius, a Veronese physician in the sixteenth century, who spoke of the seeds of contagion passing from one person to another, and he first drew a parallel between the processes of contagion and the fermentation of wine. The growth of human knowledge is by a slow and almost imperceptible process. Science progresses through periods of inactivity to periods of action, from times of barrenness to times of fruition; and so it was left for Pasteur to prove and to discover the basic principles of infection. Sir William Osler has well said that Pasteur "was the most perfect man who has ever entered the kingdom of science."

In the village of Upton, England, was born on the fifth of April, 1827, Sir Joseph Lister, who was destined to dispel the nightmare of surgical sepsis. In Lister's life heredity associations and early training were especially auspicious. His father was by vocation a well-known microscopist who, three years after the birth of his illustrious son, perfected the achromatic lens. For this achievement he was elected a Fellow of the Royal Society.

Using only dilute solutions of carbolic acid and observing the rigid precautions against bacterial invasion, Lister wrought the miracle of modern surgery. Mangled limbs healed by the Hippocratic ideal of first intention and the hectic flush of the septic patient, hitherto a common sight in surgical wards, became a rarity.

In Sir William Osler, we have one of those supremely rare souls found but seldom in medicine, one who loved his fellow-men and had deep religious convictions. I doubt not but that his philosophy of life was embodied, while trekking through this globus intellectualis, in his beloved Religio Medici, the book which was buried with him.

Sir William Osler was born July 12, 1849. To recall to our minds a mental picture of William Osler at this stage of my paper is particularly fitting as he had that marvelous ability to be a child with children which is so rare a gift. It changed Sir William Osler from a cold man of science to a bedside personality transmitting, as through an imperceptible current of electricity, morale to the small patient.

No student of medicine should allow time to proceed before he has read the life of Sir William Osler by Doctor Harvey Cushing, by the method of fifteen minutes before retiring each night. The inspiration gained thereby will assist any student, and he who practices the art of Hippocrates should be a student until the end, to gain mental poise for the trials, tribulations, and vicissitudes for the coming day.

The following quotation of Sir William Osler taken from Matthew Arnold might have been especially written for those of us who are interested in the care of the handicapped child. "Thou must be like a promontory of the sea, and Fear Not, Life still leaves human effort scope. But since it teems with ill, nurse no extravagant hope; but because thou must not dream thou need'st not then despair."

No dissertation upon the handicapped child would be complete without mention of the name of Robert Williamson Lovett, with whom I was associated for five years. At the time of his death Dr. Lovett was John Ball and Buchminister Brown Professor of Orthopaedic Surgery at the University of Harvard.

Dr. Lovett was the man who first rationalized and placed upon a concrete and practical foundation the re-education from the neuro-muscular standpoint of the Infantile Paralysis case. From his meticulous examination of the affected musculature of the individual patient and the charting of the same, he outlined, defined, and placed upon a practical working basis the re-education of the anatomico-association tracts. It was not unusual for me to spend two hours with him on one small patient.

A genius is he who is willing to spare no effort in digging out the details and fine points of a composite picture, and such was Dr. Lovett.

Well do I remember during the Infantile Paralysis epidemic of 1916 when he was in charge of the work throughout the state of New York before a clinic held at the University of Syracuse. Two minutes before the hour he turned to me and said, "John, you hold a better clinic than I do, go into that amphitheatre, do your stuff and remember that the old man is behind you every minute." When he died, I lost a second father. He taught me, in addition to surgical technique, that not from without us but only from within comes, or ever can come upon us, light.

I quote the following taken from the obituary notice written by Dr. Robert Osgood. "I knew his name would be among the last in that great honor roll of men who gave all that they had and counted not the cost."

Dr. Lovett had the God-given gift of inspiring confidence by his mental and physical poise or that which may be connoted as aequanimitas, a thing so essential in one who operates upon and cares for handicapped children.

By aequanimitas, I mean coolness and presence of mind under all circumstances, calmness amid storm, clearness of judgment in moments of grave peril, immobility, and impassiveness, or to use an old and expressive word, phlegm. It is the quality which is most appreciated by the laity though often misunderstood by them, and the surgeon who has the misfortune to be without it, who betrays indecision and worry, and who shows that he is flustered and flurried in ordinary emergencies looses rapidly the confidence of his patients. In full development aequanimitas has the nature of a divine gift, a blessing to the possessor and a comfort to all who come in contact with him.

The first essential is to have your nerves well in hand. Even under the most serious circumstances, the surgeon who allows "his outward action to demonstrate the native act and figure of his heart in compliment extern," who shows in his face the slightest alteration, expression of anxiety, or fear, has not his medullary centers under the highest control and is liable to disaster at any moment.

Trial, error, and thought will do much to develop this gift and with constant practice, experience, and will-to-accomplish most of us may expect to attain a modicum. Allow me to recall to your minds that it is related of Antonius Pius, wisest of rulers and best of men, that, as he lay dying he summed up his philosophy of life in the watchword, aequanimitas.

From my experience in my Clinic I have found that there are many angles to the problems of the handicapped child, but time permits me to discuss but two angles, besides the surgical, of the problem of the crip-

pled child. The first one seems to me to be heredity or the biological aspect, the second, conduct or behavior.

We have in the Clinic many so-called mentally normal children with physical defects, and mentally subnormal with physical handicaps. There is at present an example of a family with four offsprings. The first child of this family had double congenital club feet. The second child of this family had a harelip and a cleft palate. The third child had a harelip and a cleft palate. The fourth child had a harelip and cleft palate. The biological-embryological or hereditary character of this picture is self-evident; the explanation is not so evident.

I believe that man is the highest member of the mammal group of the animal series and that he has had a long phylogenetic history. Phylogeny means the evolution of a race or group. The life history or development of an individual organism or his ontogeny has taken many stages and many years to develop. Whether the higher apes, the gorilla for instance, went down one road of the family tree and man the other, is a speculative problem of anthropology.

Studies in heredity and embryology lead us to believe that each human animal originated from a fertilized egg cell zygote formed by the fusion of the paternal and maternal gametes that carry the ancestral traits and that the germ plasm of this zygote gives to the new organism thus started all of its potentialities of development. The development that actually takes place later must be regarded as due to interaction of this zygote and the organism that develops out of it with the successive intrauterine and post-natal surroundings in which it is immersed.

In the harelip and cleft palate family the egg cells contained the determination factors harelip, cleft palate, and so on. The realization factors will lie in the environment. Each human being passes through a long series of states: embyro, foetus, infant, child, adolescent, mature adult, senescent. The point I wish to make is that the determination factors are set before birth and we are to a greater or less degree a mosaic of our ancestral dead. From a scientific, psychological, and economic point of view these parents should have been sterilized after the birth of the first child.

In passing, it must be noted that the psychological aspects of conduct or behavior, and the teaching of compensation patterns to handicapped children is a fertile field. The first psychological premise is one of nomenclature and so in our Clinic our children are taught both to call and think of themselves as merely handicapped. These children are handicapped not crippled as the term crippled is a stigma of abnormality and of horror. A handicap must be conquered and it can be overcome, and the wish to rise above it is constantly brought to the threshold of their sense perception. In the Hospital, the Clinic, the Convalescent Home and the Orthopaedic School, our children are constantly in what I call a morale barrage, and compensation outlets are ever given them. A pair of glasses is a handicap. The boxer though out on his feet must continue the battle. If a child cannot use two arms to swim then he must swim with one.

Personal appearance and physical fitness are important factors in maintaining morale. By morale, I mean condition as affected by or dependent upon such moral or mental factors as zeal, spirit, hope, confidence, and so on. Therefore, each child desires to have *mens sana in corpore sano*. There are countless examples in history of the role played by congenital and acquired deformities in the changing of personality patterns. Louis the Fourteenth decreed a new fashion in footwear to hide his large feet. Steinmetz, the genius of Schenectady, lived the life of a recluse because of his physical deformity, and Beethoven's pock-marked countenance and eventual deafness were responsible for his unsocial conduct.

Individuals who are unable by predisposition to bear with equanimity or indifference their physical afflictions must be taught to do so if possible. Individuals of course differ greatly both in sense and sensibility; some are able to ignore at will deformities which to others constitute an insufferable calamity. To the psychologist, however, this apparent heedlessness affected by some is often but an easily penetrable mask which covers a patent attempt to overcome an inferiority complex, so-called.

The function of Orthopaedic Surgery is to overcome some of these physical defects while at the same time taking cognizance of and treating the mental twists of the patient. Because of the fact that so few are cured the psychic outlook is most important, consequently we are interested in all kinds of reactions, responses, and adjustments exhibited by the human being, and these depend mostly upon constitution and somewhat upon situation.

A person has normalcy when he is capable of performing a continuous adjustment of internal to external relations. Taking into consideration that each child which we operate upon, which we have in the Convalescent Home or in the Orthopaedic School is a mosaic of his ancestral dead, we endeavor by all means at our command to form mental patterns. These mental patterns should adjust the child to his environment in spite of the handicaps. The children should be trained to be masters of their fate. Do not be afraid to teach them this verse of Henley's:

> It matters not how strait the gate,
> How charged with punishment the scroll,
> I am the master of my fate;
> I am the captain of my soul.

Ziehn describes what he calls "the battle of motives" by the following—I see a rose in a strange garden (stimulus and sensation). A long series of ideas is aroused by the stimulus and the visual sensation of the flower (idea association). For instance the memory of the rose's fragrance comes to mind, then I think how well it would look in my room, that it is the property of another, that plucking it would be punishable, and so on. Only after the whole series of presentations has passed before the mind does action follow; and whether I pluck the flower or go my way without it will depend upon the strength and intensity of the conquering idea.

We have touched upon two basic principles. There are many more but time does not admit of their enumeration or of their discussion. It is now time to turn from the obverse, the front or principal surface of anything, of this compound silhouette of the orthopaedic child, to the reverse. In doing this we realize that it is impossible to separate the mental from the physical, but to complete the painting in the picture gallery of our minds, it is essential.

Importance of Early Recognition of Orthopaedic Defects

Helen King*

"Notwithstanding the rights of children to be well-born and to be protected throughout childhood, it is recognized that in spite of all human precautions there will be unfortunately some crippled children. These we declare to have the right to the earliest possible examination, diagnosis, and treatment, recognizing, as we do, the fact that many thousand cases of permanent crippling may be eliminated by early and effective care."

The "Bill of Rights" of the International Society of Crippled Children thus states the declaration of rights for children.

Sir Robert Jones, the greatest orthopaedic surgeon of this decade, has summarized the problem when he said:

"Catch the cripple early, and give him prompt and prolonged treatment; effective home supervision and after care; education, vocational training and adjustment to society."

The Orthopedic Committee of the White House Conference in a survey in 1931 emphasized the need when it was pointed out that:

1. There are 300,000 crippled children in the United States.
2. Comparatively few handicapped children have the advantages of early discovery, treatment, and training.
3. Less seriously handicapped are more numerous and more neglected than those who are more seriously handicapped.

"But the problem of the cripple is a world problem and every nation and state and community must finally face it and strive to meet it," is the statement made by Dr. Robert Osgood.

Practically all of the European countries, notably Germany, France, Great Britain, Italy, Austria, and the Scandinavian countries have attempted to meet the problem.

It is generally conceded by orthopaedic men that such cases as club feet, congenital wry neck, and congenital dislocation of hips are among those for which early recognition is most important, since most of these conditions if discovered in time will respond to treatment without operation. The first responsibility for recognition of such cases probably lies with the parents, the family physician or pediatrician, and nurses. Later, schools inevitably meet the problem.

Frequently a nurse or social worker on her rounds of family care or investigation has found other members of the family or a neighbor's child with some orthopaedic disability. In one family of eight children, three boys were found to have congenital disabilities. A Visiting Nurse met a child of five on the street with a bilateral congenital hip gait. She spoke to the grandfather, walking with the child, who replied that the child was born "that way and since she had no pain he guessed she would get along all right and out-grow it." He knew nothing of resources and care for such cases. She was referred to the proper source and after the necessary orthopaedic care, the child was dismissed with the disability corrected.

There are other cases which illustrate this point, such as the child with a short leg due to coxa vara condition with a developed scoliosis; and Esther, eight years of age, who was discovered in school by the school nurse, walking with a typical rocking motion of a bilateral congenital hip condition. The condition was too far advanced for any treatment but that of an open operation. Another example was that of James who developed a scoliosis due to imbalance of muscle power following poliomyelitis.

The private duty nurse and the hospital nurses carry a great responsibility in caring for children with orthopaedic diseases. Their knowledge of body mechanics, muscle, and bone anatomy must be so thorough that they are ever on the alert to correct any malposition in their patients, as in the acute stage of poliomyelitis when the patient assumes a comfortable position which, if not carefully watched, may result in contractures of knees and hips, drop foot or scoliosis. This may occur also in cases of arthritis.

During this period of economic pressure families have been unable to call in their family physician as frequently as in other years. Thus the Visiting Nurses and Public Health Nurses have had to assume more responsibility for the post-natal care of children. In this way the nurse may recognize a birth injury or wry neck or congenital hip or club foot in the earliest stage and report it to the family physician who refers it to the orthopaedic surgeon or clinic for treatment.

The following are some of the specific types of congenital and acquired disabilities presented by an orthopaedic surgeon, and illustrate the development of such a condition because of no attempt at prevention or early correction:

Congenital Types

Club Feet if attacked in the first few weeks of life can be corrected as we know, by molding and gentle manipulative measures. This can be done in a comparatively short time and gives an opportunity for a normally developed foot. Also there is a period in a child's life when the treatment can leave undesirable psychological effects. If the treatment is delayed for a year or even a few months it usually means a many times multiplied period of treatment frequently involving surgery and never resulting in an absolutely normal foot, though usually not a disabling one.

Congenital Wry Neck if recognized and treated soon after birth, frequently clears up with very little attention in a certain proportion of cases. In other cases a structural defect develops, which, after a child is a few years old, entails secondary deformities facial asymmetry and scoliosis that rarely can be completely eradicated. No child who has a residual wry neck deformity at the age of three would ever become relieved of it except by operative treatment. On the other hand it can be confidently expected to grow worse, as the rigid tendon fails to elongate with the growth of the neck.

Congenital Dislocation of the Hips can be treated prior to the age of four by bloodless methods with complete cure in approximately eighty percent of the cases. After this age the percentage of complete cures falls rapidly, unless major surgery is resorted to, and even

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with this a normally functioning hip as an end result can not be secured in as high a percentage of cases.

Obstetrical Palsy is frequently not a permanent or irreparable nerve injury, provided the tension is immediately removed from overstretched nerves. This orthopaedic procedure combined with massage to obviate muscle degeneration during the process of nerve repair will, if applied early, accomplish a complete cure in a majority of cases; otherwise there would be a permanent disability. In those cases where some degree of nerve injury is permanent, functional usefulness is still possible if there is immediate or early prevention of contractures by the usual treatment; otherwise the development of contractures prevents the return of function in the distribution of the surviving nerves and frequently necessitates surgical intervention later.

Claw Foot is a late, unexpected and too often entirely unsuspected manifestation of a congenital defect which shows first at about the age of eight with an exaggeration of the arch developing to pes cavus and relative equinus deformity as the result of nerve adhesions in a spina bifida occulta. The effects of this defect are such at an early stage as to respond to a minor grade of surgical intervention. If it is allowed to progress through lack of appreciation of its inevitableness it can be prevented from becoming disabling only at the expense of a major operative procedure and a distorted appearing foot.

Vertebral Epiphysitis or early adolescent long round back is not infrequently due to faulty posture primarily, but to organic disturbance of the vertebrae themselves called Epiphysitis which actually begins at approximately the age of ten and can usually be detected at that age by a loss of flexibility in hyperextension of the spine at a time when the actual deformity is too slight to be alarming. At this stage corrective measures will almost invariably prevent the development of a structural deformity, but in a few years the scoliosis will have developed to a degree resistant to almost any measure of correction.

ACQUIRED TYPES

The complications of poliomyelitis are fairly illustrative of the need of early recognition of the acquired defects as in contrast to the congenital ones.

The deformities which frequently may develop as a result of poliomyelitis are often more disabling in their defects than the weakness resulting from the paralysis itself. Many a child, is left to work out his own salvation by attempts at normal use of his body in spite of the fact that muscle imbalance, not readily appreciated except by a trained observer, may prevail and will surely though often slowly result in progressive deformity involving alterations of skeletal structure that can only be remedied at the expense of major surgery and unnecessary degree of ultimate impairment. Yet, on the other hand, the early recognition of this muscle imbalance, its control by apparatus during the maximum recovery period and then, if necessary, reestablishment of balance of muscle and tendon transposition will in the majority of instances result in a limb with a nearly normal appearance and function. These conditions, as well as others, are emphasized by orthopaedic surgeons over years of experience.

With the present large number of crippled children in the country, programs are being offered to individuals and organizations dealing with children. The Subcommittee on Orthopaedic and Body Mechanics of the White House Conference has already offered suggestions for educational programs for such groups. Chicago has a program for the education and prevention of orthopaedic defects which is directed by Miss Edna Foley and Miss Jessie L. Stevenson of the Visiting Nurse Association. This program is supported by a committee of medical advisors and orthopaedic surgeons.

Continuous emphasis should be placed on such programs for the prevention of orthopaedic disabilities through instruction to parents, teachers, social workers, nurses, private physicians, and health educators. Thus potential cripples can be saved, and much destructive process checked in the early stages by referring to the proper sources.

In an attempt to meet the problem of recognition of orthopaedic disabilities and early treatment several programs are being developed in Detroit. At Merrill-Palmer School the parents of the pre-school child have cooperated in a program which teaches the importance of good body mechanics. Ten class periods have been arranged for parents, the first ones are used in showing slides, both good and poor posture, of the pre-school child. Different body types are shown at various age levels through the adolescent period illustrating body change and development of malpositions of back and feet with the accompanying poor health in some cases. The danger, therefore, of overlooking the early poor body changes, is impressed upon the parents and the need for early recognition and correction of such defects. Other orthopaedic defects, congenital and acquired, are shown and discussed to impress the parent with the need for awareness of these defects, their development, and necessity for referring them to their private physician, pediatrician, or an orthopaedic surgeon for examination.

The second period is used in teaching the parents anatomy by using large charts and illustrating the various movements of the joints and explaining the muscle control and balance of the body. The various factors influencing good posture are stressed, such as good hygiene, clothing, shoes, sleep, and nutrition. The subsequent class periods are used for actual participation of the parents in posture exercises. They wear bathing suits, their own postural defects are checked and exercises for the different muscle groups and body balance are taught.

Twice a year photographs are taken of the children as a part of the physical growth study in the school curriculum. The parents study their child's photograph with the physical therapist and are advised as to the need for correction of their children's postural defects. The school physician refers any child with any organic defect to the orthopaedic surgeon.

As a result of the practical instruction in body mechanics, the parents are able to carry over postural exercises to their children at home, in which both parents and child participate.

The value of such a program would seem to be the following:

1. Through parental education, both theoretical and practical, the parents are aware of existing poor body mechanics and what it may lead to.

2. Through instruction in orthopaedic defects the importance of early recognition is understood.

3. Knowing the value of medical and orthopaedic examinations much ill health is forestalled and crippling conditions averted.

4. The education of the child and its adjustment to school and social life can be expressed more easily through knowledge of the physical potentialities.

An educational program in the Public Schools is being developed under the sponsorship of the Visiting

Nurse Association. When the Health Education Staff of the Public Schools was severely curtailed the instructors in corrective work were absorbed into the general health education program. With the increased number of children, larger classes, and fewer instructors, there naturally was little opportunity for individual work on poor body mechanics. It seemed necessary to give instruction in orthopaedic disabilities to these instructors in all the schools where there was no corrective teacher. The instructors of adolescent students have a tremendous opportunity and responsibility in recognizing potential disability at this critical age.

Therefore, a program was requested by the Health Education Department of the Public Schools for the health education instructors of the Elementary Schools in 1933, the Intermediate and the High Schools in 1934.

This emphasis increased the number of referrals by the Elementary Schools. Seventeen hundred children, under the age of thirteen, were found to be in need of treatment.

Not only have the Public Schools been aware of this problem of poor body mechanics, but there has been an increasing awareness in preparatory schools and universities for such a program.

Dr. Lloyd T. Brown of Boston reports results in a survey at Harvard University showing that 80% of the freshmen had poor body mechanics. At Yale University a similar survey reported the same percentage of mechanical defects. Such statistics show what early education in good body mechanics might have prevented.

A community program planned to reach physicians, orthopaedic surgeons, and clinics by way of the public, private, and parochial schools would seem to be the logical approach by which the high percentage of handicapped children can be reduced. The way in which the private physicians, parents, and clinics cooperate in this plan for orthopaedic care can make or mar the whole program.

The Junior League Curative Workshop in Milwaukee is an organization for the care of handicapped individuals. It is a clearing house for adults and children, disabled by accident and disease, who may receive rounded out convalescence in a limited time. The therapeutic measures used to correlate treatment include physical therapy, occupational therapy, recreational therapy, and psychological readjustment to schools, employment, and society. All agencies caring for handicapped individuals participate in this project. This workshop has maintained a high standard of specialized service for its community for fifteen years. A workshop based on the policies of this organization would seem to be of inestimable value in any community program.

Although a community program will do much to encourage a recognition of orthopaedic disabilities and early correction, there is still a need to remove the causes. Tuberculosis prevention, better obstetrics, and better nutrition programs are all tending to reduce the orthopaedic defects.

In Sir Robert Jones' words—"Important as it is to correct deformity, it is of infinitely greater value to prevent the occurrence of those diseases from which deformities spring."

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True philosophers, who are only eager for truth and knowledge, never regard themselves as already so thoroughly informed but that they welcome further information from whomsoever and from whencesoever it may come. Nor are they so narrow-minded as to imagine any of the arts or sciences transmitted to us by the ancients, in such a state of forwardness or completeness that nothing is left for the ingenuity and industry of others. On the contrary, very many maintain that all we know is still infinitely less than all that remains unknown. Nor do philosophers pin their faith to others' precepts in such wise that they lose their liberty, and cease to give credence to the conclusion of their proper senses. But even as they see that the credulous and vain are disposed at the first blush to accept and to believe everything that is proposed to them, so do they observe that the dull and unintellectual are indisposed to see what lies before their eyes,—And then the studious and good and true never suffer their minds to be warped by the passions of hatred and envy, which unfit men duly to weigh the arguments that are advanced in behalf of truth. *William Harvey.*

Reprinted from Northwestern University Medical School.

Practical Hydrotherapy

John S. Coulter, M. D.*

Although hydrotherapy is one of the oldest known forms of therapy, it has been sadly neglected. Water is so simple, so readily obtainable, and so easily applied that its benefits are often forgotten, and it is thought that to obtain the effects of hydrotherapy elaborate apparatus is required. It is the object of this short paper to direct attention to some of the procedures in the use of water that are valuable adjuncts to be used with other treatment by physical agents. The methods given can be used by the patient at home upon the physician's direction. Only such methods as require no expensive apparatus are here considered.

LOCAL APPLICATIONS

WET COMPRESSES: Throat compresses are useful in tonsillitis and laryngitis.

Apparatus: Two strips of linen three inches wide and long enough to reach under the chin from one ear to the other ear. One piece of flannel three and one-half inches wide and long enough to reach around the head, overlapping at the top several inches, and with slits cut to permit the passage of the ears.

Method of Application: The strips of linen are wrung out of water at 60° F., and placed upon the flannel, so that they reach under the chin from one ear to the other ear. The flannel strip goes over the ears and is tightly drawn together on top of the head and secured by safety pins. The compress is changed when it becomes warm and dry.

CHEST COMPRESSES: Chest compresses are useful in bronchitis and pneumonia.

Apparatus: A piece of linen cut in such size and shape as to fit the entire upper back and the chest from the clavicles to the umbilicus, with arm and neck spaces to allow the upper edges of the compresses to reach over the shoulder and to be pinned together. A piece of flannel of the same shape but an inch wider and longer is also necessary.

Method of Application: The piece of linen is wrung out of water at 60° F., and spread upon the piece of flannel so that there is an edge of flannel about one inch wide all around. Both are folded together with linen on the inside, the patient is turned on his right side, and the compress is placed upon the bed with the folded edge along the right side of the patient. The compress is opened and the unfolded arm space is placed under the left axilla. Now the patient is quietly turned upon his back, his arms raised and the other portion of the compress is brought around the right axilla and forward over the front of the chest. The flannel is brought over to cover the linen and secured by safety pins in front on the left side. The arms are lowered, the linen flaps are brought above the shoulders, and the flannel flaps are then secured over them by one pin upon each shoulder. A second compress should be prepared as above and renewed every hour.

HOT FOMENTATION COMPRESSES: Indications: Lumbago, bursitis and sciatica.

Apparatus: Two pieces of old blanket about eighteen inches square. A wringer constructed from a large towel, with sticks, thirty inches long, sewed to the narrow ends so that the ends project.

Method of Application: The wringer is placed in a basin and the blanket pieces are laid upon it. Boiling water is poured over these until they are saturated. The blanket pieces are now wrung out, so that all hot water is expelled, by twisting the towel wringer in opposite directions with the sticks. It is most important that not a drop of free water remains in the blanket compress, or burns will be produced.

The patient is wrapped in a dry blanket, and the painful part covered with vaseline. The blanket compresses are slipped out of the wringer and placed upon the affected part. The blanket is then covered over them. The compresses are renewed every fifteen minutes.

HOT WET DRESSINGS: Indications: Spreading infection.

Apparatus: Large sterile dressings, and warm sterile solutions such as boric acid or salt solution. A small electric room heater.

Method of Application: The sterile dressing is put about the affected part and moistened, not saturated, with the warm sterile solution. A thick sterile dry pad is applied around this. Over this is suspended the electric room heater or an electric lamp baker so as to keep the dressings warm. Every two hours the outside covering of the dressing is opened to moisten it with the sterile solution. Once every twenty-four hours the dressings are entirely removed and replaced, by careful asceptic technic, with fresh sterile dressings.

CONTRAST BATHS OR SPRAYS: Indications: Circulatory disturbances of the extremities, trophic lesions resulting from prolonged suppuration, and as preparation for local massage.

Apparatus: Two basins or buckets of such size to conveniently immerse member treated, or bathroom spray and source of hot and cold water.

Method of Application: Affected part is placed first in hot water (40°-45° C.) for one minute, followed by cold water for one-half minute. These alternating baths are repeated for fifteen minutes, always beginning and ending with hot water.

HOT SITZ BATH: Indications: Prostatitis, painful hemorrhoids and dysmenorrhea.

Apparatus: An ordinary washtub may be used for home treatment.

Method of Application: The water in the tub should reach to the level of the patient's umbilicus when the patient is sitting in the tub. The water should be at a temperature of 98° to 104° F. Duration from fifteen to thirty minutes. The patient's body is covered with a blanket and the feet and legs wrapped snugly in a separate blanket.

THE WHIRLPOOL BATH: Indications: Painful stumps, painful and adherent scars, purulent wounds, indolent ulcers, acute arthritis or fractures of the joints of the hands, wrists, elbows or feet, inflammations of joints, muscles and tendons of the extremities. The whirlpool bath may be given advantageously as a preparation for massage and movement which by the use of this bath are rendered easier and less painful.

Apparatus: The best equipment for this bath is a specially manufactured vessel of suitable size to accommodate the arm or leg, with water delivered at high

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temperature and mixed with air by hydrostatic pressure or by an electric mixer. The temperature of the water is controlled by a thermostatic valve. The water temperature is started at 100° F. and increased to the patient's tolerance (115° F.). Where there is any loss of sensation the duration of the bath is from fifteen to thirty minutes.

If such an apparatus is not available the Council on Physical Therapy of the American Medical Association has prepared directions by which a local plumber may make such a bath from a wash boiler and ordinary pipe fittings.

GENERAL APPLICATIONS

FULL WET PACK.

Indications: Nephritis, arthritis, psychosis and psychoneurosis.

Contraindicated in: Circulatory disturbances, cardiac derangement, in extreme exhaustion and when reaction would be problematical.

Apparatus: Any ordinary bed and mattress. If packs are to be repeatedly renewed, two beds and double equipment must be provided. Dishpan or large basin of cold water on small table or chair. Pillow. Rubber sheet or large pieces of oil cloth. One sheet, size 81 x 90. One or two woolen blankets, size 81 x 90. Small towel. Hot water bottle or soapstone.

Preparation: One person may envelop a patient in wet sheet pack. If the patient is violent two assistants may be required. The room temperature 68-72 degrees F.

To prepare the bed: Spread a rubber sheet over the bed and a blanket over the rubber sheet. Place top edge of blanket so that it will be three inches above the patient's shoulders. If the blankets are small, two may be used, placed lengthwise across the bed, overlapping to the approximate size of the wet sheet.

The best results are obtainable when the sheet is folded in such a way that it may be easily spread out under the patient while he is reclining on the bed. Fold the sheet lengthwise and in plait-like folds of six inches to eight inches wide. Now fold crosswise, forming a bundle six inches to eight inches wide and approximately thirty inches long. This leaves the sheet in a convenient form to be immersed and wrung out. The sheet is dipped in cold water 60-70° F, and wrung out.

Method of Application:

1. Patient should be in the nude. . . . Work fast and from one side of the bed. . . . Turn the patient on his side and over to the far side of the bed.

2. Lay the folded wet sheet in the middle of the bed one inch below the upper border of the blanket.

3. Unfold the sheet lengthwise. . . . (It will look like a white strip dividing the middle of the bed.)

4. Unfold half of the sheet crosswise, over the vacant portion of the bed on top of the blankets.

5. Roll the patient onto the wet open half and spread the other half over the bed. . . . (Patient will shudder at first contact with the cold wet sheet. . . . Discomfort should pass quickly.)

6. Have patient raise arms above head.

7. Fold one-half of sheet closely over patient, high under the arms.

8. Have patient lower arms down to sides.

9. Wrap the remaining half of the wet sheet around the patient, upper edge closely surrounding the neck, by making diagonal fold across chest.

10. Press a fold down between the legs and feet and fold lower end under the heels. . . . Be sure the sheet clings snugly to the body everywhere. . . . Sheet should be snug but not binding. . . . Too tight wrapping makes the patient both uncomfortable and apprehensive.

11. Fold one-half of blanket over the patient smoothly around the neck and over the chest. . . . Tuck corner under the shoulder and edge under body and legs.

12. Repeat with other half of blanket and tuck lower end under heels. . . . Patient should be getting thoroughly warm now and becoming relaxed. . . . Be sure to guard against cold feet and any prolonged chilling. . . . If feet will not warm up, use hot water bottle. . . . Work fast. . . . A towel may be tucked around the patient's head for comfort.

The patient may stay in the pack forty-five minutes to one hour.

HYTERTONIC SALT BATH.

Indications: The immediate care of extensive burns for the relief of pain and the treatment or prevention of shock.

Blair[1] gives the following advantages of the combined use of the saline bath and dry heat in the treatment of wounds:

1. Freedom from painful dressings. For patients who are first seen with badly matted and stuck dressings and clothing, the bath is the best and least painful method of loosening the dressings and the clothes may be cut away with the patient in the bath.

2. It is probably the least expensive of any and may be carried out in the home.

3. After the routine is once established, nursing care can almost supplant the care of the doctor, except for his daily inspection.

4. This method will encourage active and passive motion and reduce contractures to a minimum.

Apparatus: The large continuous bath hydrotherapy tub is ideal, but in the home or where this tub is not available, the ordinary bath tub may be used with a support for the head and pads on the bottom of the tub.

Method of Application: The bath is kept comfortably warm by the continual flow of warm water, and up to 5% sodium chloride is added. Tub is kept clean but no attempt is made at sterility. Patient is placed in the bath two to three hours daily. During the remainder of the day he lies without dressings on a Bradford frame elevated to allow irrigating fluid to run off the rubber sheet. Electric lamps to supply warmth are placed over the patient on a special frame and this is covered with sheets. Every hour a pint or more of saline solution is poured over the patient to prevent crusting.

The above methods are only a few of the many therapeutic uses of water. These methods require no expensive apparatus and water is easily obtainable, but there is a necessity of exact technic in the methods of application if the treatment is to be successful.

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Epiphyseal Stimulation to Increase the Length of Extremities

Claude N. Lambert, M. D.*

Almost daily the school physical therapist sees children walking with a limp, due to one lower extremity being shorter than the other. Perhaps she has wondered, consciously or not, whether something might be done to improve the walking of that child by operatively making the legs more equal.

There are several conditions that will cause a shortened extremity, but the most commonly observed in the school child is anterior poliomyelitis which has involved one leg, but which has left the other one almost or entirely alone, with a shortening and wasting of the affected leg as contrasted with the good one. Baking, massage, whirlpool baths, etc., have been given the affected leg to preserve the general muscle tone, but in a great majority of cases the leg remains shorter than its fellow.

To compensate for this difference in length between the legs two courses were open. First, the growth of the good leg could be retarded or stopped by doing an epiphyseal arrest as suggested by Phemister. This meant slowing down growth in the good leg so that the poorer or shorter one could catch up with it in length. The operative technic was not very complicated, and Phemister and others report some very good results. The other course that was open was to lengthen the short leg by operatively sectioning the bones of the leg (almost always the tibia and fibula were taken for this) and then plastically lengthening them. This type of procedure was advocated by Abbott and others, and in their hands has given good results. However, the operative technic was quite complicated, and needed considerable apparatus, and whether because of fear or because of lack of equipment, or both, actual bone lengthening has not been done as yet on a very large scale. The theoretical complications are many, but in talking with those who are doing this type of reconstruction, the actual complications are few.

In January, 1933, Ferguson gave a preliminary report on what he called an epiphyseal stimulation. The underlying principle of his report is that during the period of growth, if the medullary blood supply to the growth region (the metaphysis) is interrupted without the periosteal blood supply to the end of the shaft being disturbed, an increase in the rate of longitudinal growth of the metaphysis is noted. The proof of this principle is seen in children who have had an osteotomy of the tibia without section of the accompanying fibula. The tibia then grows faster than the fibula. Also in several other types of cases in which the medullary blood supply has been interrupted—fracture, bone cyst, and even in osteomyelitis—it has been noted that the affected leg becomes slightly longer than its fellow, at about a thirty per cent increase per epiphysis. This amounts to about one-eighth inch annually for each epiphysis affected during the growth period. Ferguson's technic is very simple, and needs no special equipment. In brief—through small skin incisions about half way between the epiphyseal line and the middle of the bone, the periosteum is incised and a small hole drilled through the cortex and into the medullary cavity of the bone. The medullary blood supply is then interrupted by means of a small curet introduced through the drill hole. We have followed this procedure on several occasions and have had no operative difficulty and no complications.

There are certain advantages and disadvantages to each of these three methods of equalization. In the epiphyseal arrest the advantage is that the procedure is relatively simple. The disadvantages are that (1) the good leg is being used and thus the child is losing a certain potential amount in height, which the individual is loathe to lose, unless exceptionally tall for his age. Also some individuals do not want anything done with their one good leg, saying that one bad leg is enough, and they are not willing to chance any operative work on the good one, and (2) the changes in length are not soon apparent, but take time until the shorter leg has had a chance to grow up to the point where the good leg was when growth was stopped. If the shortening were great, the time element here would be several years.

In the bone lengthening the advantage is that the results are very soon apparent, because the actual lengthening is done in a short time, and the poor, short leg has been the one operated upon. The disadvantages are the difficulty in the technic, the equipment needed, and at least the theoretical possibility of infection, ununited fracture, etc.

The advantages of the epiphyseal stimulation are that the technic is simple, the poor, short leg is used for the operation, no casts or other equipment is needed, and hospitalization is at a minimum. If the difference between the legs is great, more than one epiphysis can be stimulated at the one operation. The only disadvantage, as we see it, is that the results are not immediately apparent, but do show up gradually until full growth has been attained.

Assuming that the stimulation described above increases growth one-eighth inch per year per epiphysis, we then have a method of determining just how much stimulation is needed. For example, suppose the difference in length is one inch, and the child is six years old, with a growth potential until fourteen in girls and fifteen in boys, then only one epiphysis need be stimulated. If the difference be one and one-half inches, and the child eight or ten years old, then two and possibly three epiphyses should be stimulated. The results are checked by repeated x-rays, and if the rate of increased growth begins to slow down after a few years, the stimulation can easily be repeated. It has been found that the order of preference for stimulation is (1) the lower end of the femur, (2) the upper end of the tibia and fibula, (3) the lower end of the tibia and fibula, and (4) the upper end of the femur.

While our series at present is small, and sufficient time has not yet elapsed to give definite data on our cases, we believe that the underlying principle is sound, and with the simple technic that it involves, more epiphyseal stimulations could, should, and will be done.

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Applied Psychology and the Physical Therapist

By Miriam Van Tassel*

Very little thought is given to the need and use of applied psychology by the ordinary run of physical therapists. Truly it is a subject and a medium which should be constantly used by the general physical therapist as well as by the orthopedic and psychopathic physical therapist.

The psychology which we received in our elementary or preliminary training should have made such an impression on us that we automatically make use of it in our daily routine. The physical therapist specializing in psychopathic work uses it regularly and it is not for her use that I am endeavoring to present to you a brief insight as to what goes on in our patients' minds or of what importance is the nervous system and its exponents to success in physical therapy.

Cicero says that "The diseases of the mind are more numerous and more destructive than those of the body."

When speaking of the well mind we may say that we use psychology; but when the mind is ill it is treated by psychiatry or applied psychology.

What is Mental Health? It is behind the cause or sometimes directly the cause for physical health. To quote Dr. Karl A. Menninger—"Mental Health is the adjustment of human beings to the world and to each other with a maximum of effectiveness and happiness—not just efficiency, or just contentment—or the grace of obeying the rules of the game cheerfully. It is all of these together. It is the ability to maintain an even temper, an alert intelligence, socially considerable behavior and a happy disposition."

Each being is governed by the physical and psychological—physically, by the Nervous System—psychologically by the "Personality" which is an inherited nucleus containing both physical and psychological tendencies.

"The Nervous System is the mechanism concerned with the correlation and integration of various bodily processes and the reactions and adjustments of the organism to its environment." The cerebral cortex is concerned with conscious life and may be divided into two parts, central and peripheral.

The peripheral nervous system consists of a series of nerves by which the central nervous system is connected with the various tissues of the body and these may be divided into cerebrospinal and sympathetic.

The nervous tissues are composed of nerve cells which chiefly compose the grey substance of the brain, neuroglia, and nerve fibers, of which the white substance of the brain is largely composed.

It is impossible to devote more time and space here for further detail of the physical side of the nervous system. Let us then turn to the psychological side which is composed of "Personality."

In the terminology applied to the physical, an ill bone is termed either diseased, fractured or broken accordingly—thus with "personality" we term an ill or sick personality as a "broken personality." As we type various fractures as green-stick, compound, etc., we may class "broken personalities" as:

a—*ORGANIC DISEASE type*—"crippled personality" e. g. T. B., Thyroid gland disorder, Pituitary disorder, Brain Tumor, Encephalitis, General Paresis, Congenital Syphilis, etc.

b—*HYPOPHRENIC type*—"stupid personalities" which may be defined as "Persons handicapped by difficulty in capacity for thinking, learning, reacting to perceptions, making decisions." We probably speak of them as feeble-minded. From the more intelligent class we descend to the Moron whose intellectual capacity is from eight to twelve years and thence down to the Imbecile and Idiot both of whom practically always have defective brain structure. The Idiot, perhaps, has the greater number of classifications:

1. "Mongolian is characterized by Chinese appearance and sweet disposition.
2. Amaurotic—by congenital blindness.
3. Familial—by sudden appearance and persistence in families.
4. Hydrocephalic—by large heads caused by water on the brain.
5. Microcephalic—by small heads (under-developed skulls).
6. Little's Disease—by paralysis and convulsions, all caused by hemorrhagic injuries of brain at birth.
7. Encephalitis—by residual symptoms of inflammation of the brain.
8. Syphilitic—by characteristics developed by chemical laboratory tests.
9. Cretinous—by e idence of insufficient thyroid gland secretion.
10. Frohlich's—by excessive fat deposits in body and deficient genital development.
11. Cerebral Agenesis and Aplasia—by incomplete brain development."

c—*ISOLATION type*—"lonely personality."

d—*SCHIZOID type*—"queer personality."

e—*CYCLOID type*—"moody personality," "up-mania, down-melancholy."

f—*NEUROTIC type*—"frustrated personality."

g—*ANTI-SOCIAL type*—"perverse personality."

May I again omit further detail and refer you to "The Human Mind" by Dr. Karl A. Menninger, from which you will receive a liberal and interesting education with illustration by case reports, etc.

As with diseases of the body or physical side, we must have specific treatment for diseases or illnesses of the mind. They too, are treated by medicine, surgery, occupational therapy, physical therapy and psychotherapy. Psychotherapy seems to consist principally of two forms—"Suppression" whereby the thoughts are offered by other than the patient, and "Expression" whereby the patient himself takes hold of things and does them himself.

We, as a profession are chiefly interested in the physical therapeutic treatment. Physical therapy is used not only to restore function in injured and paralyzed parts, but also to prevent the occurrence of deformities and contractures. It is to help maintain normal nourishment in muscles which are paralyzed beyond the power of restoration of normal function. The use of physical

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therapy applies also to diseases of the brain and spinal cord, their nerves and coverings as well as to the peripheral nervous system. In some of these it is a highly efficient means of treatment; in others, it is merely a means of bringing greater comfort to the patient without, in any sense, restoring function due to the pathology at the seat of the disease.

The most familiar of these are: Hemiplegia, Infantile Cerebral Hemiplegia, Pseudobular Paralysis, General Paresis, Paralysis Agitans (Parkinsonism), Brain Tumors, Myelitis, Syringomyelia, Hemalomyelia, Spinal Cord Tumors, Combined Sclerosis, Landry's Paralysis, Progressive Muscular Atrophy, Amyotrophic Lateral Sclerosis, Myasthenia Gravis, Progressive Muscular Dystrophy, Facial Paralysis and The Neurosis.

Returning to the "primary" mental diseases which I am sure we treat most frequently and are seldom truly recognized by the physical therapist, we have those classifications known to the psychiatrist as the NEUROTIC TYPE. These may further be classified as:

1. Psychosthenia—which is comprised of doubts, fears, anxieties, obsessions.
2. Neurasthenia—in which the patient complains of multiple physical ailments on little or no organic basis.
3. Hysteria—in which there are physical symptoms usually visible and without complaint by the patient.
4. Alcohol and drug addiction.

We as physical therapists and human beings can do a great deal in the prevention of mental illness—let us help, and to again quote Dr. Menninger—

1. "Set up as an ideal the facing of reality as honestly and as cheerfully as possible.
2. Cultivate social contacts and social development.
3. Recognize neurotic evasions as such and take advantage of opportunities for sublimations.
4. Learn to know the evidences of mental pathology and how best to deal with them.
5. Assume that the unhappy are always wrong."

Let me say, don't turn a deaf ear to the person who complains of a pain where we know it is not likely to be—let us be sympathetic—find out what is behind that complaint. I do not mean to encourage complaint but rather to undermine the real cause. I have only attempted to bring to your attention a small phase of the huge subject—it would take a life-time to cover it entirely, but I trust your interest has been aroused sufficiently so that you will endeavor to give more time and thought to it.

Let us try to help that most difficult and almost intangible of ailments "broken personalities" by understanding what is taking place in the patients' minds. When we have discovered this and it is fully comprehensible, let us with our acquired knowledge seek to help that one to help himself.

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Training Teachers for Orthopaedic Classes

Charles M. Elliott*

It is coming to be more and more clearly recognized that of all the agencies interested in the crippled child none is of more importance than the school, and of the school the teacher is one of the most vital factors. After the child has been found, examined, hospitalized and operated upon, he is then turned over to the school and what happens to him there will finally determine in a very large measure the success or failure of the whole program. It is obvious, therefore, that the selection and training of the teacher is a matter of paramount importance.

The state of Michigan recognized the important part the public school plays in the work for the crippled child, and coincident with the passage of laws providing for state aid, the State Board of Education established a training school for teachers of handicapped children at the Michigan State Normal College. The task of setting up a training school for teachers of such children was not a simple one. Since this was an absolutely new field of education, no precedents had been established. The work was of a strictly pioneering character. For these reasons more or less experimentation has been necessary.

The care and education of crippled children, or any other type of handicapped children, is not and cannot be regarded as distinct and separate from other phases of public education. To so consider it would be economically unsound, administratively inefficient and would not contribute to the greatest educational and social advantage of the children.

There are in the United States 10,000,000 children who are more or less seriously handicapped either physically or mentally. In this huge army of unfortunates are found at least ten different types of handicaps. This means that approximately one-fourth of the school population the country over stands in need of special educational provision in some form. It can readily be seen that to attempt to set up separate and distinct machinery for the education of these various groups, either by the state or the local community, would not be wise procedure.

Many of our states today are recognizing that the handicapped child has an equal claim with his more fortunate brother to an education, and that it is sound public policy to assist the local school units in providing the necessary facilities. This means that state funds must be provided and state machinery set up for their administration. There are many organizations interested in specific types of handicapped persons and each is likely to appeal to the state legislature for funds. When each separate group is interested in its own project alone, conflicts and rivalries for support are apt to arise, in consequence of which the interests of all are likely to be jeopardized. State educational authorities are coming to feel, therefore, that a central agency equipped to deal with all types of handicapped children through which all groups may unite to present their needs to the legis-

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lature and under whose supervision state funds appropriated for this purpose may be expended, is by far the most efficient type of organization.

In like manner, cities have found that a central department of special education dealing with the whole problem is most efficient and economical. Such an organization brings the education of the handicapped child into coordination with the other divisions of the school system, thus making it possible for him to take his place as a member of the school community and make the contacts so essential to his social development.

It is readily seen then that any program set up in a state teachers college, related as it is to the State Department of Education on the one hand and to the Public School Systems on the other hand, must conform to the conditions found most advantageous for those institutions. Much of the work necessary in the training of teachers for one type of handicapped child is common to the training for all types. For this reason it is economical to train teachers for the several types in one college and in the same classes as far as this can be done. The Department of Special Education at the Michigan State Normal College is organized for the purpose of providing the schools of the state with teachers adequately trained to teach the various types of handicapped children.

But while there is much of a common nature in the training of these teachers there is also much of it that is specifically suited to the training of the teacher of each particular group. From this point I shall endeavor to confined myself to a consideration of those attainments which may be regarded as necessary to the teacher of the orthopaedic class.

In order to determine what is essential to the equipment of workers in any field, it first becomes necessary to define the objectives of the work to be done. What, then, are the aims and objectives in the teaching of the crippled child? What and how should the crippled child be taught? It would seem that the objectives of the orthopaedic class might well be considered in the light of the several needs of the child, which may be stated as follows: 1. His physical needs; 2. His mental needs; 3. His social needs.

The primary reason for assigning a crippled child to a special class is that because of his physical condition adequate service cannot be rendered him in the regular school organization. The physical restoration of the child should be, therefore, the point about which the whole program of the school revolves. Whatever is done to or for the child in the school should either contribute to, or at least should not interfere with, his physical improvement. But while the body of the child is being brought as far as possible toward normal functioning, his mental development need not and must not be neglected. The therapeutic value of a mind well and interestingly occupied is well known to orthopaedic surgeons. The academic program need not be neglected and if adjusted to meet the intellectual abilities of the child, need not differ materially from that of the grade to which the child normally belongs. Indeed, it is often found that with the sympathetic individual attention which the child gets in the special class, the handicapped child may equal or surpass the record made by his normal fellows. It should be borne in mind, however, that with so much of his time necessarily spent in rest and reconstructive treatments and exercises, the time spent at his books will be limited. Another fact that should be remembered in considering the school progress of any handicapped child is that through limitation of experience, he will, on the average, fall below other children of his own age in ability to do school work.

Every effort should be made to help the child to adjust himself socially. His success in life will depend very largely on his ability to forget his handicap. To do this we must study our own attitude toward him. It will be in his social relations that he will find this most difficult, particularly at adolescence. The greater his success in this direction while in school, the less will be his need of guidance and adjustment after he leaves school.

With these objectives in mind, then, we are ready to ask ourselves: 1. What should the teacher be? 2. What should the teacher know? 3. What should the teacher be able to do? The answers to these questions determine our training program.

I. As to what the teacher should be, we believe—

1. That she should be a healthy normal person from every point of view. We do not approve of handicapped persons aspiring to become teachers of handicapped children. The mental hygiene of the child plays such an important part in his general well being that he has a right to the most healthy surroundings.

2. That she should be mature enough to understand and appreciate the peculiar phases of this type of teaching and yet not so old as to be incapable of making adjustment to new experiences and requirements. The field of special education is no place for the person who has failed in the regular lines of teaching or who has been out of teaching for many years and is now anxious to get a new lease on educational life.

3. That she should be a person with broad social interests, willing to regard every phase of the life of the child as her responsibility. She should have the type of sympathy based upon understanding and devoid of morbid sentimentality. She must be able to distinguish between needs and wants. She must understand that the only lasting help which can be given to the handicapped person is that which assists and encourages him to help himself.

II. What should the teacher know?—

1. Since the general nature of the education of the crippled child is the same as that for any other child, we believe that the general training of the teacher should be equivalent to that of any other teacher in the grades of the public schools. This training she must receive before entering on the specific course of training for teaching crippled children. This means that she must be well grounded in the principles of psychology and education, as well as in the subject matter of the school curriculum, before becoming a candidate for orthopedic training.

2. The teacher should have a knowledge of the normal pupil. This should have been acquired through actual teaching experience with normal children. This also is a prerequisite to training as an orthopedic teacher. I might say that in our own training course we require each candidate to have at least two years of training in normal school or college and at least one year of actual successful teaching experience with normal children before they become candidates for training as teachers of handicapped children.

3. With the preceding as a background, the student is given not less than one full year of training for her special work. The content of the courses offered during this year are based, as suggested above, on the several needs of the pupil, and the effort is made to give the teacher facility in meeting them in a satisfactory manner. To this end there are many things she must know. She should know the relation between her own work and that of all other agencies interested in and dealing with

the crippled child—the home and its problems, the school organization, nursing service, visiting teacher, service clubs, civic organizations, hospitals, physicians, state commissions, departments of rehabilitation, etc. This knowledge we endeavor to instill not only through formal college courses but also through visits, special lectures, clinics, etc.

She should be skillful in determining the mental and physical capacities of each individual pupil so as to be able to adjust him most advantageously to the work of the school. To this end she is given courses in special tests and teaching methods.

She must have some knowledge of the relation of foods to the health and development of the child, hence courses in home economics and nutrition are required. Courses are given in Industrial Arts emphasizing the curative and therapeutic values. These include designing, making and decorating of toys, book bindery, basketry, and other forms of occupational therapy. As the training of orthopedic teachers is centered around the development of the child's physical, mental, and social aspects, games and recreational therapy play an important role in the program. The student teacher should realize and fully appreciate the benefits of play. Not only is play necessary for diversion in the class room but it gives the child an opportunity to learn various methods of amusing himself at home and outside of the class room. The handicapped child must resort to his own means of entertainment and amusement and this alone is an important feature of his education. This may well correlate with the physical therapeutic treatment to develop rhythm, coordination, precision, and accuracy. It is, therefore, essential that the student teacher be familiar with various types of games such as peg games, manipulative toys, puzzles, ball games, singing games, playing of percussion instruments and simple folk dances. Competitive games are splendid. Competition with the possibility of success is extremely stimulating and develops self-confidence in the child. Not only should the teacher be familiar with games, songs, and simple dances, but she must choose such activities as are not detrimental to the physical condition of the pupils. Importance is placed upon speech correction, an understanding of which is necessary because of the speech difficulties which are so often found in the orthopedic class.

In the practice school the student comes into actual contact with the children and receives there not only experience in adapting the work to the child, but also a working knowledge of the school equipment and furnishings. She sees reasons for the room on the ground level, sill-less doors, special seats and supports, convenient toilet facilities, etc.

Throughout their entire course the students are in close contact with the work of the physical therapist, in whose department the real work of rehabilitation is mainly carried out. Thus the prospective teacher becomes familiar with the various curative agencies in use, such as heat, massage, exercise, both active and passive, hydrotherapy, actinotherapy, and electrotherapy. It is not our purpose to train our students to do the work of the physical therapist, but she should understand the nature and causes of the conditions which bring children into her classroom. The teacher must be constantly alert to protect the child from injurious activities, as well as to hold him up to the performance of beneficial ones.

III. What should the teacher be able to do?—

1. She should be able to teach in such a way that the children who so often come to her discouraged and depressed, with a forlorn and hopeless outlook upon life, may see that after all there is something in life for them. That they possess powers which, if developed, will free them from the bondage of their physical deformities and point them to a happy and useful future. This sort of teaching and these results may be found today in hundreds of class rooms throughout the land.

2. She must know her problems so well and have such faith in her work that she is able to sell the cause of the crippled child to her community. She must be able to tell her story so convincingly, both in public address and through the press, that the apathetic mind of the average citizen may be aroused to the possibility and necessity of the "eradication of crippledom."

Infantile Paralysis

W. B. Carrell, M. D.

So much deformity in children results from the improper care of the extremities, following infantile paralysis, it is thought wise to discuss briefly the general subject indicating the results of research and clinical investigation during the past few years, without making any attempt to credit the various investigators with the particular work they have done. The most valuable contribution in recent years has been the introduction of immune serum, which has not only lowered the death rate, but lessened appreciably the extent and severity of muscle damage. The prevention of deformities, therefore, is so intimately associated with the treatment of early cases of infantile paralysis that the following brief discussion is warranted.

Anterior Poliomyelitis is an acute disease occurring chiefly in childhood, having epidemiological characteristics, similar to the usual infectious diseases occurring during this period.

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Etiology: A filtrable virus, transmitted most probably through the nose and throat, borne by healthy carriers, or by contact with some cases during the acute illness. Milk and raw foods have been known to contain the virus and to have been responsible for small epidemics.

Epidemiology: The incidence of polio is much less than that of most of the infectious diseases as measles, diphtheria, etc., yet most people, approximately 90%, become immune by early adult life. This may be attributed to the widespread occurrence of abortive cases, conferring immunity and the immunization of people in thickly settled sections from repeated contact. This latter is by reason of normal resistance of the nasal mucosa and of the choroid plexus. The disease is endemic throughout the world with occasional epidemics, chiefly in the warm season of temperate and northern countries. Even during epidemics the attack rate is low.

The disease is probably most communicable during the prodromal stage, while the virus is incubating in the

nasal mucosa. It has been proven that immune bodies are formed by the second or third week. A safe quarantine period is four to six weeks.

SYMPTOMS

First stage, pre-paralytic period: Following the incubation period there is general toxemia, manifested by nausea, vomiting, elevation of temperature and after two, three or four days a persistence of headache or return of headache and evidence of spinal irritation. The muscles in the neck are fairly rigid, with soreness over these and muscles of the spine. During this stage there may be increased reflexes, slight muscular tremors of the extremities. The involvement of the anterior horn cells initiates the stage of paralysis.

Paralytic stage: The paralysis is motor in type, partial or complete, and may involve any group of muscles or any several groups. In the lower extremities the distal muscles often first show involvement, with subsequent inclusion of the larger muscles, while in the upper extremity the proximal muscles are frequently involved first. After some days or some weeks there is a gradual return of function in many of the damaged muscles and in some cases complete return. There are undoubtedly many cases which do not even reach the second or paralytic stage, but have only the prodromal symptoms, mild in type and recover without any paralysis.

TREATMENT

Acute paralytic stage: There is conclusive proof that convalescent serum given during the pre-paralytic stage will in some cases prevent the occurrence of paralysis or lessen the extent and severity of paralysis. The serum should be given at the earliest moment after making a diagnosis and should be repeated at twelve to twenty-four hour intervals until there is improvement in symptoms. A great deal of work has been done both experimentally and clinically during the past few years with convalescent serum. While definite conclusions cannot be drawn at the present time, it appears that the Rosenow's immune horse serum is of doubtful benefit, certainly not as valuable as convalescent serum. Serum from adults with natural immunity is probably as valuable as convalescent serum. Should this prove to be true, it will be of distinct value in treatment because 90% of adults are immune and in the absence of the convalescent serum the blood of a parent should be given with a reasonable prospect of having immune serum.

Immunization as a Preventive Measure: If the serum is definitely beneficial in the treatment of early cases, it should be efficacious for immunizing children who have been exposed. Experimentally, this has been done, and applied clinically in a limited way. Exposed children can be tested for immunity, but the laboratory equipment is not available except in large centers and the expense for general use would be prohibitive. It would seem wise, however, in view of the general immunity of adults to give exposed children an intramuscular injection of serum from one of the parents.

In addition to general hygienic measures, repeated spinal punctures should be done for the purpose of lessening the fluid pressure. There have been sufficient reports to justify this measure in routine treatment.

TREATMENT DURING THE PARALYTIC STAGE

If serum has not been given, one or two injections should be given even after the stage of paralysis and if it has been previously given, one or two injections may be repeated. It is very doubtful if any benefit will result from serum given during this stage, nevertheless, it may be given.

Muscle Protection: The muscles deprived of motor nerve supply need very careful protection to prevent stretching by the active muscles or by gravity. During the early period, lasting three to six or seven weeks, there is considerable tenderness over these muscles and in this stage rest is most urgent. It is unnecessary to make a detailed study of the various muscles involved because such study would add injury to the muscles. By having the patient move the limb one can determine very readily the group involved and place the limbs in such support that the particular group will have relaxation and rest. For instance, if the patient is able to push the foot down, but unable to dorsiflex the foot at the ankle, the extensor muscles should be placed in relaxation or be shortened. This would require a light splint or pillows to prevent the foot dropping into plantar-flexion and stretching the weak extensor muscles. The same thing would apply to the knee, for should the quadriceps be paralyzed, there would be the necessity for maintaining the leg is a straight position to avoid stretching the quadriceps over the bent knee. A good general policy if the lower extremities are involved in several different groups, is to place the legs in a neutral position with the feet at right angles to legs and with the knees straight. Use suitable sand bags or paddings so that the legs will not rotate to the outer side or fall to the inner side. In such position all muscles will be at a fair state of rest and have the position for the earliest opportunity for recovery. During this period and particularly after the second or third week, a professional masseur could do some very gentle movements to advantage, but the chances of doing harm by rough manipulation outweigh the benefits which might come and it is therefore advised that no massage or manipulation be done during the four, five or six weeks while the tenderness is present over the muscles.

The importance of this care of damaged muscles must not be under-estimated. Fully 50% of the operative work the Orthopedic Surgeon must later do on those crippled by infantile paralysis is devoted to the correction of deformities. Often three or four operations are necessary to correct the deformity before the actual stabilizations and transfer of balance can be carried out. These deformities are in many instances preventable. The doctor who treats the child during the first eight or ten weeks is therefore in a position to apply skillful and valuable preventive medicine.

TREATMENT DURING THE CONVALESCING STAGE

After the soreness has disappeared from the muscles and there remains localized weakness in various muscles the patient is ready to have a definite regime of re-education of his muscles. During this entire period muscle rest and support is continued with adequate bracing and continued bed treatment for a number of months. Gradually as the muscles are stronger the patient is up and about, still with weak muscles supported. The re-education of muscles is based on the knowledge that many cells in the spinal cord capable of carrying on a function to a definite muscle have not been active because the adjacent cell has been carrying on the duty. This cell, uninjured, may finally pick up the load carried by the damaged cell, only if the functional stimulation of the muscle has been carried out in a proper manner. A muscle turned free, permitted to stretch with fibrous contractions, and with the sheath contracted, will not return to function even though the nerve supply may have recovered in the inter-

val. Many muscles will not come back because the entire area of support has been completely lost, but since this cannot be definitely foretold during the early period, they are given the same treatment as the muscles whose nerve supply has been temporarily out of commission. The regime of muscle training has been well worked out by Dr. Lovett and others and much training and some art is required of the physical therapist who directs this phase of the work. When the exercises have been well started, the mother can often be taught to carry them on at home, returning only for frequent checking and change of exercises as may be necessary.

Warm Pool Work in Polio Cases: The value of under-water gymnasium work for muscle training has been proven to be of much greater value than exercises given on a table. This is not because of any chemical or other intrinsic value in the water, but because the release of gravity permits the child to exercise the muscles better, and allows more different kinds of movements than would be present on the table. Another advantage is that the warm water relaxes the muscles, improves the circulation, and creates more interest from the patient, thereby stimulating more cooperation. Most clinics and hospitals now treating polio cases have provided some means of under-water treatment.

Reconstructive Measures in Polio: When it has been determined by conservative treatment of muscle training and protection that muscles will not recover, and this period usually requires anywhere from eight to eighteen months, sometimes longer, measures must then be considered for re-stabilizing the joint, through operative procedures on the muscles or bone. The character of such procedures and the time for doing them requires special consideration of the individual case and is not properly in the province of minor Orthopaedic Surgery.

Some Phases of Fatigue

Harriet Harrison*

There are two types of fatigue which have very similar symptoms but, upon close examination, will be found to have different causes. The first should be called false fatigue for it is not truly neuromuscular, but is caused more by ennui due to temporary needs of the body, such as activity, sleep, social intercourse, or food. This type of fatigue may be readily dissipated by supplying the body need. True fatigue may be caused by diverse conditions, such as excessive physical effort, physical deficiencies, inherited or acquired chemical unbalance, or prolonged emotional stress. In either type there is something wrong. Whenever fatigue continues it should be looked upon as a danger signal calling for careful replanning of one's life, physically, mentally or socially.

False fatigue is of the acute variety that is usually recognized and remedied, but the other type is more insidious because of its gradual cumulative effect and the likelihood of its being unrecognized. Since true chronic fatigue disturbs the function of every system of the organism, muscular, nervous, circulatory and vasomotor, the observable symptoms may have many variations. Some of these are listed by Seham and Seham[11] as follows:

Poor muscle tone; restlessness; poor coordination and unsteadiness of hands and arms as they are held sideward; a weary or unhappy expression with dark circles under eyes; repeated contraction of some muscle of the face; vasomotor disturbance as revealed by the case with which the face becomes successively red and pale; feet and hands cold and frequently mottled and clammy; disturbances of the circulatory system evidenced by throbbing seen in vessels of the throat.

The most obvious cause for true fatigue is overactivity of the skeletal muscles. As the muscles contract, certain chemical changes take place, at first locally in the muscles used; and later, if the activity is continued, the waste products from this group of muscles are carried to other parts of the body, resulting in a general feeling of fatigue. The chemical wastes produced by the muscles are mainly lactic acid, monophosphoric and carbonic acid. People vary in their ability to supply adequate oxygen to the active muscles so that the reduction of lactic acid will take place on the spot of production. Unless in excellent training, several hours may be needed for recovery after violent exercise. The amount of available glycogen will also be a factor in determining the possible output of energy, this being especially true of exercise continued over a long period of time.

In measuring the oxygen requirement for a given task, it is necessary to compute the oxygen used during actual work and recovery, less that which would be used during the same period if the body were at rest. Hill[4] states that the greatest oxygen debt is usually found after very violent exercise of short duration and so recovery is proportionally longer. He has found that it is only in mild exercise that a steady state is possible and that this is reached in two minutes after starting activity. In all other cases the oxygen intake is below the oxygen requirement and must be made up later. The time required for recovery will be proportionate to the severity of the exercise and the state of muscular health of the subject.

At times after vigorous exercise there may be a very localized feeling of soreness due partly to minute ruptures in the muscle fibres and also to an infiltration of diffusible waste products within the muscle sheath and interstitial muscular lymph spaces. Gould and Dye[8] state that there may be an increase of twenty per cent of previous weight of the muscle. This condition would, of course, produce marked tension and a feeling of stiffness.

Before there can be much damage from overuse of the skeletal muscles, there usually occurs an enforced suspension of activity. Physiologists state that unless the muscles are excessively stimulated, activity is suspended as a result of too much acidity, which causes failure of the muscle buffers to neutralize the acid formed. Changes in the plasma membrane of the cell also occur so that there is a reduction in the permeability of the membrane to oxygen. Since recuperation cannot take place except with the aid of oxygen, the fatigue state may be considered similar to partial asphyxiation. Many of the symptoms of fatigue are strikingly similar

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to the effects of narcosis—for example, elation, emotional instability, reversion to childish habits and a feeling of false stimulation similar to altitude jag.

There is also a tendency for the persistence of attention to increase with ensuing fatigue causing the reactor to insist on doing the same thing even when a change is needed. Johnson[7] gives, as an example, the tired driver near the end of a long trip who is unable to stop driving to do other things. Another common example is the tired child who fights hard against being put to bed.

Many people have thought that cessation of activity is due to nervous fatigue, but this is not exactly true, for the nerve fibre is very seldom affected and what is thought to be nervous fatigue is in reality a condition of muscular fatigue and of fatigue of the nerve synapses. The true order of fatigability is as follows: (1) motor and organ (junctional tissue between muscle and nerve), (2) muscle and (3) nerve fibre.

Besides physical overexertion which causes the type of fatigue that rest will quickly repair, there is the more cumulative type of fatigue which is the result of undue strains over a long period of time. In this class should be included the strain due to overuse of the normal eye, or to the excessive muscular effort caused by a definite eye defect. Partial deafness with its unavoidable strain in trying to hear as well as the emotional tension caused by trying to understand will also hasten fatigue. Other physical conditions, such as poor musculature, malposition of the body, pain, undernourishment, anemia, nasal obstructions, focal infection and illnesses, either chronic or acute, may all be contributing factors to fatigue. Certain developmental periods in the child's life are called fatigue years. This is especially true of the years from seven to ten because of the slow development of the heart.

The chemical balance of the body is of great importance both in promoting the release of energy and in causing fatigue. The secretions from the suprarenal bodies have a beneficial effect in both preventing fatigue and hastening the recovery from it. Adrenalin exerts a general metabolic effect on muscle structure and causes better distribution of blood to working muscles, nerve centers, heart and lungs, and also better use of sugar for energy needs. In periods of emotional stress adrenalin is automatically discharged into the circulation and serves to reinforce the sympathetic nervous system which makes possible a great renewal of power. This action explains the apparent unbelievable feats of strength that have been accomplished under great emotional stress.

The adrenals are not the only glands that cause fatigue states because of chemical unbalance. A hypothyroid condition may make one seem lazy and tired while a hyperthyroid condition may cause periods of high excitability and drive, alternated with periods of fatigue and depression. The parathyroids are associated with calcium metabolism which will affect the tonicity of muscle and in the milder forms of parathyroid insufficiency the Neurological Institute of New York City has repeatedly encountered these three apparently unrelated complaints in a certain type of case of adolescents: (1) fatigue (2) slowness of growth (3) conduct disorders.[14] The whole problem of the role of internal gland secretions is gradually being explained and at present there are many experiments under way, the results of which may increase our understanding of the causes of the tired child.

Since certain emotions, such as pain, anger, fear, and rage, can influence the internal secretions, if long continued, these may cause real fatigue. R. G. Hoskins[5] says, "Worry is worse than work and unless physical reaction takes place results compared to that of opening the throttle and tightening the brakes of an automobile will result and the machine suffers serious breakdown."

Another important cause for fatigue is loss of recuperative sleep. Koffka[8] has shown that this is especially important to consider for children. His experiments with the muscles and nerves of young animals demonstrate the greater fatigability of the muscles of the young, which would indicate the greater need for rest. Renshaw[10] found that loss of sleep equivalent to one-third the normal amount was almost certain to lead to disturbances in conduct and it was also detrimental to health and growth. Loss of sleep for some may cause an immediate feeling of tiredness but for many there is often a feeling of pseudo-freshness and performance is improved. This is due to the first stimulating effect of the fatigue toxins which draw upon the latent stores of energy. As fatigue progresses, however, undesirable symptoms develop such as impairment of motor ability, irritability, light-headedness, nervousness, a feeling of mild intoxication, blankness of mind, lack of inhibition and fatigue so extreme as to cause positive pain. At times, however, a feeling of exhilaration may result. (Renshaw[10] p. 171.)

Since rest and sleep are so important in repairing fatigue, it is important that causes which interfere with the sleep pattern be studied. Coffee and drugs have long been considered important factors but Renshaw[10] gives us some new facts concerning the influence of the movies on children's sleep. He states, "Predormal impressions may persist and produce a continuation of high tonus in the muscles. Sound sleep comes only in relatively complete relaxation of certain large segments of the body with disappearance of certain reflexes (Czerny, Karger), heightening of electrical resistance in the skin (Peiper, Jacobson) and the cessation of imagery, among other things." (Renshaw[10] p. 24.)

With these facts in mind, he examined the sleep records of 170 children from six to eighteen years by recording their changes in posture minute by minute. His findings undoubtedly proved that, after attending an evening movie, the sleep patterns of the children were altered definitely enough to interfere with recuperative sleep. It is especially important to realize that the greatest increase in mobility took place in the early part of the night when sleep should be at its best and also that their sleep pattern still varied from normal the second night after attending the movie. On the average boys showed about 26% and girls 14% greater hourly mobility after the movies than in normal sleep. It would seem therefore, that it is unwise for children to attend the movies very frequently and that only those pictures that have unusual educational or recreative value are sufficient justification for their attendance.

Not only do the movies cause a stream of imagery that may affect rest but many individuals constantly suffer from muscular hypertension as a result of other psychic disturbance or from various physical causes. Jacobson[6] asserts that though every clinician has realized the importance of rest, there have been few important scientific studies that would increase our understanding of the process of relaxing so as to obtain its great therapeutic value in relieving hyperactivity. He shows that for many it is necessary that they be taught how to relax if they are to obtain recuperative rest.

It has been found that if the patient is taught how to relax the voluntary system there will usually follow

a similar quieting of the vegetative processes. The emotions also tend to be less active as relaxation progresses. Jacobson[6] stresses, however, that, for many, true relaxation is a very gradual process, a matter of habit formation that may take months. At the start one can only hope that the patient may be able to obtain relaxation of one localized muscle group and gradually progress until relaxation of much larger masses may advance past the stage of residual tension. He explains that when relaxed in the ordinary sense there may still be signs that reveal the presence of residual tensions among which may be an active mind, irregular respiration, reflex activities such as wrinkling the forehead or spastic oesophagus or colon. It requires very little additional relaxation, however, to eliminate these tensions.

The use of relaxation is not restricted to the recumbent position. In order to move effectively, there must be differential relaxation which is described by Jacobson as "a minimum of tension in the muscles requisite for an act along with the relaxation of the other muscles." Most athletes know the value of this type of relaxation, for such economy of neuromuscular energy prevents fatigue or jerky movements. It is this very character of their performances with its free flow of movement that makes it so pleasurable to watch. Dancing teachers, too, are realizing the importance of localized control in one part and complete relaxation in the unused parts and such exercises as the "fold and unfold" and "controlled rolls" on the floor are especially effective. If economy of energy is not obtained, there is excessive misdirected effort and the greater likelihood of fatigue and injury.

It is important that those who teach physical education should not only be skilled in body mechanics but also should have a sound background of knowledge in relation to the symptoms of fatigue, its physical and chemical changes, and their effects. It is essential that the teacher of physical education appreciate that for some students true relaxation will be more helpful than exercise and that often the chronically fatigued need, not only rest, but correction of physical defects or help in emotional adjustments so that he may acquire that "quality of life that will render him fit to live most and serve best."

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The Posture Problem Up to Date

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Worried parents with weak-backed children and a puzzled public braced up with artificial supports, and even chest-bound athletes with deformed backs pulled out of place by big muscle development, all present a challenge to physical educators in no uncertain terms. We do occasionally find the 100 per cent baby, but in spite of generous school equipment and enormous expense devoted to the question of physical education, the results are disappointing. Alas, how content the majority of people are to slump! It is increasingly difficult for the child to grow up with well balanced physique while it is exceptional to find the adult who has grown to middle age keeping the flexibility and resiliency of muscle and grace of posture which should rightfully be expected.

These unsatisfactory conditions point to basic faults of instruction and a misconception of body mechanics, a fact which is recognized in the best work today in this field of endeavor. It is not too much to say that the habit, encouraged by generations of mistaken instruction, namely, that of "throwing the hips and shoulders back" in the vain hope that this movement will straighten the spine, is responsible for a deplorable prevalence of weak and hollow backs, sacro-iliac instability, prolapse of abdominal and pelvic organs, and the relaxed, burdensome condition of the inactive hip muscles and a thousand attendant ills.

It is the purpose of this paper to show that this fundamental teaching from which we have suffered so long, and still suffer, is obsolete and must give place to better understanding of body mechanics. Any approach to the subject of posture of the body must first consider the basic laws of motion to which it is subjected, the most important of which are the laws of Gravity and Equilibrium. Efficiency demands economy of force, minimum friction, and localized control which lead in turn to balance, ease, and aesthetic values.

It may be well to refresh the memory with the definition of gravity and equilibrium as given in the textbooks: "Any body on the surface of the earth is constantly being pulled toward the earth by the force of gravity. The line of gravity in a given body is reducible to a single force in a line passing always through one point fixed relatively to the body, whatever be its position relative to the earth or other attracting mass, that point is called the center of gravity. When a body or object is true to a line of equilibrium this force is expended without distortion or change of position of its component parts and the effect of the gravitational pull is zero. It is not necessary that the body be at rest to be in equilibrium provided the parts of the body retain their balanced relationship at mechanical advantage."

It is the established working principle that the line of equilibrium in the body posture should fall through the lobe of the ear, down through the middle of the shoulder and hip joints, to a point just in front of the ankle, and that the different parts of the body should

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be held as closely as possible to this line to minimize the effect of the gravitational pull, to keep the weight incidence within this line of balance, and to keep this force grounded, so to speak, and its effect as near to zero as possible.

When the central alignment of the body becomes faulty, the bony supports become unstable and the weight incidence, stresses, and strains of the complicated movements of the body fall upon displaced joints and stretched muscles, never intended to bear the pressure, with consequent wrecking of the human frame, or some parts of it, just as surely as want of alignment will cause the collapse of any architectural structure. Functional difficulties follow as a consequence.

THE SPINE

From a mechanical point of view it is evident that the spine is the central supporting column upon which the various segments of the body depend. The four graceful curves which it presents lend strength and grace if rightly proportioned but when exaggerated lead to collapse in greater or less degree, of every segment of the body structure while functional difficulties follow as a matter of course. It is necessary that the correct alignment of the verticals and horizontals be obtained, and to ensure these points being strengthened before it can be expected that the muscular levers and pulleys can work to advantage.

It follows that if the force of gravity exerts a downward pull upon the body structure, as in the common position when head and shoulders sag forward and the hips tip backward, it makes it difficult for the anti-gravity muscles to keep the balance. All muscle action demands balance of muscular contraction, for the moving and sustaining power of the human machine is muscular energy, and, as in all working machines, the grand object is to get the greatest power with the least expenditure of energy, this desirable attainment is to have skill, efficiency and grace of movement.

The human body is directly subject to two of the primary mechanical powers, the lever and the pulley. In the study of the lever it is not so much the amount of power necessary to move a certain weight but what power is necessary to balance it. When balance is secured then motion starts by the increase of power, and this power, to be efficient, should be without friction or it should be reduced to the minimum.

The spine of the baby usually presents only one long curve until it is influenced by forces brought to bear upon it in carrying the weight and balancing the body weight against many antagonistic energies. The five layers of erector muscles of the back of the spine must be balanced by the action of muscles on the front of the spine—the Pre-Vertebral muscles. The possibility of voluntary control of these groups of muscles and their great importance in the body posture have been entirely overlooked. These groups are important muscle bands intended to reinforce the joints at these points where the chief stresses are centered, and constitute the real antagonists to the back muscles. The first necessity is to find the key to strengthening these primary controls.

FIRST POINT OF ATTACK—THE HIP REGION

It is an amazing thing that the importance and power which it is possible to gain from the proper use of the hip and buttock muscles should so long have been overlooked. It stands to reason that the heaviest structure and the bulkiest muscles should be a strong center instead of the weakest. Commonly these muscles are relaxed, burdensome, and useless instead of being the most valuable braces for holding the hips in alignment. The difficulty in controlling these muscles at first indicates the neglect to which they have been subjected. The following suggestions for exercises are merely meant as a guide to these fundamental controls which should be the basis for all activity. Fortunately these fundamentals are permeating the best gymnastic work in many countries and at last the very desirable "carry-over" from class-room to life habits is beginning to take effect. Further proof of the value of these revolutionary principles is seen in the encouraging results obtained with paralysis and scoliosis cases.

RULES: Take all movements very slowly without jerks, and with full balancing control obtained by resistance of the opposite forces.

Muscle fibre has four qualities—Contraction, Holding, Relaxation, and Rest. When at rest it should be in a state of tonic contraction, or tone, like a good piece of elastic, ready for instantaneous response to nerve stimulus. The Holding quality of muscle is very important as a developer.

Repeat every movement from 5 to 10 times at first always with localized control.

EXERCISES:

1—Lying on the back with knees crooked—endeavor to contract and pull down with the buttock muscles until the pelvis is turned forward. Count 4 to contract, 4 to hold, and 4 to relax. This effort can be made in all positions—standing, sitting, walking, and should become the initial position for all movements.

2—Same exercise but increase the power of the contraction until the hips are raised from the floor to an oblique line from knees to shoulders. Note the automatic contraction of the lower abdominals as they contract and draw the hip girdle forward.

3—Stand on hands and knees. Roll hips down-and-under and then up.

4—Add bending of the elbows bringing the head to the floor and then push up on the middle (hollow) back and lower back chest to a "cat's back" position. Later add the weight of a sand-bag (or other object) to give resistance.

5—Standing position—feet a little parted so that all the muscles of the legs become active—keep this same hip control ("hide the hips"), and bend the upper body forward the weight being borne by the lower back and hip muscles—then raise the upper body to vertical.

6—From this fundamental position with body stooped forward, add weight lifting (sand-bags), arm raisings, arm flinging, trunk turnings, etc., always with the control of the lower back as fixation or starting point.

The hip region is literally the controlling center of the whole body. Good muscle takes up less room than poor tissue, hence before long the flabby muscles tone up and the hip muscles become less burdensome—the best way to reduce! It may help to think of the hip muscles as guy-ropes at the back of the hips, balanced in their turn by groups of deep-set groups in front (particularly the Psoas, Iliacus, and other hip flexors), which keep the body balanced on the hip joints.

To quote the old assertion of Archimedes, "Give me a fulcrum and I will move the earth," may well be applied to the body mechanism, for it is by muscular power exerted from fixation points that the best pulley and leverage action of the muscles can take place. Clumsy movement is due to the fact that the body has very uncertain central controls, or bases from which action can originate. The chief fixation points of the body necessary to perfect control are (or should be) at

the three stress points of the spine, namely, at the base, at the neck, and between the shoulders.

Holding the hip control has the tendency in some to make the upper part of the body lean forward too much while others lean backward from the waist. This difficulty brings to mind another mechanical principle which must be considered, namely, that all mechanical stress must meet the resistance of antagonistic force to find balance. For instance, to straighten a bent rod it is necessary to fix both ends and apply stress in the center. Fortunately, the antagonistic point for all three stress points of the spine lies at the upper end of the breast bone. With the base of the spine fixed as directed, the effort should be made to push up on this part of the chest, it must be the *upper part of the sternum only*, thus increasing the distance between this point and the three stress points of the spine, when it will be found that the whole body is brought into alignment, the chest is pivoted backward, drawing the angle of the ribs backward, while the chest expands at the back.

SECOND POINT OF ATTACK—THE "HOLLOW BACK" OR LUMBAR REGION

Closely associated with the hip control, emphasis must be placed upon building out the hollowed part of the back and lower chest *at the back*, the region deplorably weak in an alarming number of people, whereas it should be the strongest controlling center. The aim must be to make it so. Long generations of wrong instruction have tended to over contract the muscles which pull the hips backward, pillows have been used mistakenly in the hollow curve and only emphasized the difficulty as the multitude of weak backs testify. They have almost been accepted as a necessary or inevitable product of the age, and braces resorted to in an attempt to repair damage.

But Nature had not failed, 'tis we who misunderstood her principles. Deep set in the waist region is a fine reinforcing muscle that has just one reason for existing, namely, to brace against too great contraction of the back layers of muscle. Neglected, it lies often like a piece of old elastic, sagged and useless, while the lumbar spine is left at the mercy of the drag of heavy hips, loose burdensome muscles, a pelvic girdle tipped backward, and a slumped chest dragging forward from the same point. The picture is discouraging but Nature is kind and responsive and it is gratifying to find that a little carefully graded work can relieve much of the nervous irritability, weakness, contractions, and disability caused by incorrect alignment in this region. The following exercises give a key to this control:

EXERCISES:

1—Sitting—Hold a bath towel around the waist, the two ends in front. Pull forward on the towel as the waist is pushed backward against the resistance of the towel. Shoulders incline forward not backward.

2—From the same position—place the towel higher up over the lower chest and push out the lower ribs—pure muscular effort.

3—"Cat's back" exercises as explained.

4—Stoop grasp standing at the bar—pelvic rolling down-and-under and reverse upward with push out on the small of the back.

Complete eradication of the lumbar curve is not desirable, as there should be a slight graceful curve in the normal, and above all flexibility. Types of posture which show the obliterated curve, equally wrong, and usually accompanied by long, rounded dorsal spine and stooped shoulders, should work with the exercises for shoulders and chest, to be explained later.

THIRD POINT OF ATTACK—HEAD AND NECK POSITION

The flexible column of the neck spine, like that of the lumbar spine, is at the mercy of the cross pull of complicated musculature and is especially subject to vertical collapse, due to the weight of the head and excessive contraction of the erectors of the upper back, which cause the neck spine to buckle forward and the chest to slump. Here, again, we have adequate but neglected provision for the balance of these muscles, which are, as before, the Flexors or Pre-Vertebral muscles of the neck, very important anti-gravity muscles.

To overcome this Cervical Lordosis, effort should be made to reverse this forward curve by arching the neck backward ("put the check rein on!"), with a strong push up on the back of the head until the chin is horizontal and the neck spine aligned with that of the rest of the back.

The Anti-Gravity muscles, or flexors of the Cervical spine, are the group of bands on the front of the spine, and the endeavor should be made to call these muscles consciously into action. The many crossed muscles on the sides and front of the neck are the benders and twisters of the neck and should be relaxed and not constricted (as is usual) in all head erector movements. Perhaps it is helpful to think of those little Chinese mannikins which have their heads fastened on top of a strong spring, where they bob up and down at every vibration, untrammelled by surrounding neck muscles! And we have often seen the restive pony give a free swing up and down to the neck when impatient to be off, so different to the old worn-out Dobbin in the pasture, with drooping neck and weak knees!

EXERCISES:

1—Support a weight on the head (sand-bags are good—4 or 5 pounds), exerting a powerful uplift by these spinal erectors only. Use in marching, sitting with trunk twisting, shoulder work, etc.

2—Sitting, or standing, drop head to the chest, raise backward against the resistance of the clasped hands, or towel, or scarf, or pressure given by a partner.

Mastering this head position will fix the upper ends of the neck muscles while the lower insertion of the muscles, which are inserted into the upper ribs and clavicle, will have the very desirable effect of raising and deepening the upper chest as the common stress point for all the three important points of the spine. This position is seen to perfection in Greek statues, particularly the "Victory" of Samothrace. We can be very sure that the lost head was held in beautiful poise upon an erect neck completing the impression of strength and vitality of the whole statue. A "Victory" with a sunken chest and collapsed neck is unthinkable! The Greeks considered balance and proportion as the first essential in their gymnastics and art.

SHOULDER AND CHEST POSITION

It is only when the control of the base and upper part of the spine are mastered that it is time to consider the carriage of the chest and shoulders; in other words, the fundamental structure of spine, hips and neck region must be in good alignment before the shoulder girdle (*i. e.*, shoulder blade, collarbone and arm), can function correctly. The reason for this is that the shoulder girdle is auxiliary, like a bird's wing, and capable of extensive travel over the chest wall, with little direct influence upon the position of the spine itself.

The chief fault in most systems of training when dealing with bad shoulder posture, and indeed in athletic

training generally, is that too much emphasis has been placed upon great shoulder development without the necessary fixation point between the shoulders (the intra-scapular muscles), which should serve as the fixed origin for arm movements. In other words, there should be independence of control of the shoulder-blade muscles to fix the bones near the spine, the movements of the arm being independent to a large degree.

With the spine fixed at each end, and at the center, the group of shoulder-blade muscles can be trained to draw the bones back toward the spine until the muscles make a crease in the center, and so build in good muscle where often there is a blank. From this fixed position the arm movements can be performed, in a manner similar to the wing movements of a bird. Aim first for control, strength will follow.

EXERCISES:

1—Either sitting or standing, support the weight of the arm (either actually or mentally) then draw the shoulder-blade (one at a time), down and inward toward the spine by the Lower Trapezius in particular. Avoid any pushing of the arm. When the Dorsal spine is too rounded it interferes with the free action of the shoulder. In these cases it is necessary to gain flexibility and straightening of the spine to a degree first. Use pressure and chest expansions over sand-bags between the shoulders when resting.

2—When the intra-scapular muscles begin to respond add the resistance or pull on the arm by a partner.

3—From all stoop standing positions watch the localized control of this group of muscles as arm movements of every kind are taken. Note the ease with which arm movements can be accomplished—the first lap toward grace and aesthetic values.

THE CHEST

Too much emphasis has been placed upon the development of the chest by breathing exercises and not enough upon the control of the chest position by muscular support. When the rib-cage is braced and the diaphragm, which is antagonistic to the chest walls, is freed from the cramped and constricted condition so commonly met with, it will become the radiating center of power as it should be. Then the function of breathing will become easy and natural, and the force of the breath will depend upon the depth of expansion of the walls and floor of the chest working from the rib hinges at the spine, in a similar way as the bellows work from a hingle. This brings the whole chest, back as well as front and side walls, into play. The chest walls will remain in good position supported by muscle strength and will not collapse so easily. The effect upon the abdominals, so much emphasized, becomes purely secondary and can be ignored.

EXERCISES:

1—Resist with towel or scarf as the chest walls are expanded by pure muscular exertion. Think particularly of the lower back chest expansion. This will cause the ugly angle of the ribs in front to pivot backward as the chest is pulled into alignment.

2—Exercises for slow exhalation by diaphragmatic control are the most useful. It is the person with diaphragm under good control that wins the contest. The same principle applied to ordinary affairs of life gives more vitality and reserve power.

ABDOMINAL EXERCISES

It becomes a matter of great satisfaction that when the spine is well braced the abdominal muscles *automatically* begin to fall into line. It will be noted that when the buttock muscles are braced the lower abdominals contract, a fact which should prove that it is better to concentrate the attention on these back erectors rather than upon retraction of the abdominals, so often advocated. The latter method tends to rigidity of muscle and to an undesirable pull downwards of the chest, and is not sustained.

Another matter generally overlooked is that the side-abdominals, splendid groups which are meant to control the waist region in all twisting and bending movements, have their origin from the back and therefore give the desirable pull backward from the spine as fixed point, provided the spine is braced. Compare the action of the side abdominals on the horse when it will be apparent that exercises in the "all-fours" position are very valuable.

All the time-honored developers, the twistings, bendings, rollings and leg raisings are invaluable in developing tone in the abdominal walls, but note that the value of these is increased ten-fold if done with firm hip control and flat back.

FEET

The vexed question of foot posture, and foot difficulties, comprise a very complicated subject. Any change of weight incidence affecting the balance of the body at once alters the mechanics of foot control. Fortunately by following the foregoing principles better balance is obtained in the control of locomotion. It is not usually realized that correct balance depends upon hip control! There must be the mechanically fixed point in the hip region from which the lower extremities can swing easily and the weight carried forward always near the equilibrium line, free from uncertain wabbling or settling downward of the weight at each step so commonly observed. When the weight of head and chest are kept high and a little forward, the body falls naturally onto the spring of the foot, which is meant to receive it, if not interfered with by unnatural footgear!

The following points are of value in balance and locomotion:

The feet should take the weight equally.

The thrust of the body weight should fall straight forward through the legs and foot, but controlled from the *hips*.

Meet the thrust with strong foot grip, calling the muscles of the soles of the feet into action instead of allowing the weight to press heavily upon weak and stretched muscles, misplaced joints, and stretched ligaments.

Strong hip control and the push up of "anti-gravity" muscles, as explained, will meet the necessities of the gravity pull downward, if elasticity and spring of the foot are preserved.

Use the feet parted a few inches as fundamental standing position to ensure the inner muscles of the leg and thigh coming into action, which they do not do when the legs are kept close together—a common cause of postural knock-knees.

Use the straight knee bendings, with strong hip control.

All foot grip exercises are of great value.

The effects of gravity are two-fold: (a) Acceleration of movement. Control this inclination by very slow balance movements, slow marching balance walking on a line with weight on the head. These movements tend to strengthen the resisting anti-gravity muscles.

(b) The second effect of gravity tends to distortion, buckling forward of the body from neck to ankle in more or less degree. This force must be met with an

active foot power which should push or spring the weight forward-upward with a resiliency—a flitting over the ground—for the foot is the active organ of locomotion and not simply a fixed support, alas! too often used as a club or stilt.

The relation of foot skeleton to leg skeleton is such that, uninfluenced by ligaments and muscle pulls, the normal line of weight bearing falls on the inner side of the foot and tends to roll the ankle inward, hence every exercise which strengthens the muscles of the inner side of the leg and thigh are to be desired, as these should be the stronger set of supports. There is without doubt an intimate connection between weak feet, debility, and poor posture with its attendant ills, for as neither the transverse or the longitudinal arch have any true keystone it is very necessary to emphasize the importance of freedom and activity of the foot muscles. It has been proven that when walking in high heels there is comparatively little action of the muscles of the legs as well as the feet; this results in less nutrition and less perfect circulation. High heels upset the architectural balance of the feet and legs and the effect of the incorrect attitude is felt in the spine and pelvis. High heels induce and aggravate hollow-back.

SUMMARY

Good posture is an active process, both physical and mental, and the result of a counterplay of many reflexes, and governed by many cross pulls and leverage power. Without this active process the body is liable to more or less vertical collapse.

Exercises for direct effect upon the spinal supports are the first necessity until good posture becomes a habit.

The old order of "Hips and shoulders forced backward to make a nice curve in the middle of the back" is obsolete and must be run to ground!

The approved methods work for the development and control of intrinsic versus surface muscles. Localized control is the first aim, strength will follow. The first effect of stiffness and rigidity will give way to ease and grace as the muscles become strong and well toned. The student is then ready to carry these fundamentals into sports, skills and aesthetic work of every kind and are guaranteed to lead to proficiency.

The usual weak centers of the body, namely, the lower back, neck and mid-spine regions are weak because they bear the stress and strain in the control of the whole body. These points, then, should receive first attention to make them the strongest points instead of the weakest.

Arm movements should be independent of shoulder-blade control.

To gain industrial efficiency there must be an adjustment of the machine, coordination of the various factors to produce the manufacture and expenditure of energy with the minimum of output; so in the body, the muscles which are the storehouse of energy, should be kept in condition which will best give the "carry-over" from class to life habits, a condition deplorably lacking in most systems in current use.

The generality of weak-spined humanity is sadly out of plumb and requires revolutionary tactics to rescue conditions of more or less disability. The fundamental keys to central control of the body which have been outlined give a feeling of conscious power and strength which lead to encouraging results.

Local Diathermy in Peripheral Circulatory Disturbances

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With the Technical Assistance of Kathryn Blakely

Heat is a time honored measure in the treatment of peripheral circulatory disturbances of the extremities. It is one of the best known means of relieving pain and limiting the spread of gangrene and ulceration. Diathermy, as it is now known, was recommended in the treatment of articular and circulatory disturbances by Nagelschmidt in 1897, after he demonstrated that high frequency currents produced heat when passed through the tissues.[1] It has been shown that it is possible to produce deeper heat with this agent than by any other means.[2] Heat applied externally cannot penetrate deeply because of the skin resistance and because the circulating blood removes it rapidly. The heat of diathermy is produced within the tissues faster than the heat regulating mechanism can dissipate it. The immediate effect produced is a transitory stimulation of the nervi nervorum followed by a quickened arterial and capillary circulation, and by a vasodilatation of the blood and lymph spaces. This is followed by an increased vascularity between the poles.[1] Kovacs[3] lists the clinical actions of diathermy as (1) active arterial hyperemia and hyperlymphemia, (2) local relief of pain by the heat acting on all the nerve endings, (3) antispasmodic action, and (4) bactericidal action.

In the peripheral circulatory clinic of Michael Reese Hospital all patients with arterial disturbances of the lower extremities are placed on a routine management for a three to four weeks period of observation. The regimen consists of rest, contrast baths and Buerger's exercise. Tobacco smoking is stopped, and local diathermy treatments of one hour each are given twice a week to each extremity. If the patient begins to improve, we continue this treatment. If there is no improvement, we resort to the more radical forms of ther-

TABLE 1.—*Protocol of Case 17: Arteriosclerotic Ischemia of Lower Extremities**

	Pulses	Before Diathermy 3/26/32	After Diathermy 3/26/32	6/2/32
Right:	Femoral	++	++	++
	Popliteal	+	+	+
	Dorsalis pedis	+0	+	+
	Posterior tibial	+0	+	+
Left:	Femoral	++	++	++
	Popliteal	+	++	++
	Dorsalis pedis	+	+	+
	Posterior tibial	+	+	+
	Skin Temperature			
Right:	Above knee	32.6 C.	34.2 C.	31.8 C.
	Below knee	32.4	34.0	31.6
	Above ankle	32.2	37.2	31.4
	Dorsum of foot	32.4	36.0	30.6
	Ball of foot	30.8	34.4	29.4
	End of big toe	30.0	33.4	28.4
Left:	Above knee	32.4	34.0	32.0
	Below knee	31.8	34.2	31.8
	Above ankle	31.4	37.0	31.8
	Dorsum of foot	31.2	36.0	30.8

*From the Peripheral Circulatory Clinic and the Department of Physiotherapy of the Michael Reese Hospital.

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	Ball of foot	30.2	33.8	30.0
	End of big toe	28.4	33.0	28.6
	Histamine Test			
Right:	Above knee	++	++	+++
	Below knee	+	+	++
	Above ankle	+	++	++
	Dorsum of foot	+	++	+++
Left:	Above knee	+	++	+++
	Below knee	+	+	+
	Above ankle	+	++	+
	Dorsum of foot	0	++	+++
	Mouth temperature	37.0	37.2	37.1
	Room temperature	22.0	22.0	21.6

* Treatment consisted of diathermy by means of double cuff and plate, with a current of 1,000 milliamperes. Before treatment was started the patient had pains in the calves of the legs and in the ankles after walking one or two city blocks. After two months of diathermy he was able to walk six blocks before the pains started.

apy, as typhoid vaccine or hypertonic salt solution intravenously, nerve blocks and the like. We have found that almost all cases of arteriosclerotic ischemia without gangrene, and a few of the mild cases of thrombo-angiitis obliterans, are improved by this management both subjectively and objectively.

PROBLEM AND METHOD

This investigation was undertaken to determine the value of diathermy and the part it plays in the improvement. A series of various types of cases was tested. Pulsations of the larger arteries were graded, the skin temperatures were taken and histamine skin tests were made to determine local circulatory efficiency before and one-half hour after diathermy was given. The patients were given diathermy treatments twice each week for a period of two months and were then tested again (table 1). No other form of therapy was given during this time. In all cases the extremities were exposed to the room temperature for twenty minutes before the initial readings were made. The diathermy was administered with the patient in a sitting position. Cuff and plate electrodes were used; the cuff was placed around the thigh just above the knee and the plate under the anterior half of the foot and the toes. The approximate size of the electrodes is 6'x8' and 3'x19'. The two extremities were treated at the same time by using bifurcated cards. A current of from 750 to 1,000 milliamperes was employed in most cases. In a few debilitated individuals, 600 milliamperes was all that could be given without discomfort.

TABLE 3.—*Summary of Results from Table 2*

Diagnosis	Closed Vessels Opened, Per Cent	Open Vessels Improved, Per Cent	Average Temperature Rise: Maximum, C.	Average Temperature Rise: Big Toe, C.	Histamine Test Improved on Dorsum of Foot, Per Cent
Thrombo-angiitis obliterans	53	86	5.2	3.6	70
Arteriosclerosis	58	50	5.1	3.1	62
Raynaud's disease	100	70	6.5	5.7	50
Average in arterial cases	59	45	5.3	3.6	65
Normal subjects	..	20	3.7	2.2	25

The controls for this investigation were the previous histories of the patients tested. In each case there was a history of long standing disability in spite of various types of treatment. The results are summarized in tables 2 and 3.

In order to determine whether the rise in the skin temperature and the improvement in the skin reaction to histamine were due to the direct action of the diathermy in heating the tissues or whether they were due partly to relief of the vasospasm which accompanies all types of arterial disease, a few individuals with normal circulation were tested. The results are shown in tables 2 and 3.

COMMENT

The immediate results of the diathermy are as follows: In cases of arterial disturbance, 59 per cent of the nonpulsating vessels were made to pulsate, and the pulsations of 45 per cent of all open vessels were improved as compared with improvement in only 20 per cent of the vessels in normal subjects. The average maximum rise in the skin temperature in cases of circulatory disturbance was 5.3 degrees C., as compared with 3.7 degrees C. in the normal subjects, and the average rise in the skin temperature of the big toe was 3.6 degrees C., as compared with 2.2 degrees C. in normal persons. The peripheral circulation as determined by the skin reaction to histamine was improved in 65 per cent of the cases of arterial disease and in only 25 per cent of the normal cases.

The rise in the skin temperature was most marked about the foot and ankle. There was no noticeable injury to the atrophic skin by the rise in the skin temperature. With all these changes locally, the general effect was negligible, as was shown by the slight rise in the mouth temperature or no change at all in some of the cases. This is of considerable importance in view of the fact that many of these cases are debilitated and show some myocardial degeneration.

The opening of 58 per cent of the closed vessels in the case of arteriosclerosis is definite evidence that there is a high degree of vasospasm in those cases to an extent not previously known. This fact and the greater rise in temperature in the cases of circulatory disturbances in the normal subjects indicate that relief of vasospasm is one

TABLE 2.—*Summary of Results After Half an Hour of Diathermy**

Case	Name	Diagnosis	Diathermy, Milliamperes	Arteries: Closed Vessels: Number	Arteries: Closed Vessels: No. Opened	Arteries: Open Vessels: Number	Arteries: Open Vessels: No. Improved	Skin Temperatures: Minimum Rise, C.	Skin Temperatures: Maximum Rise, C.	Skin Temperatures: Average Rise Big Toe, C.	Histamine Test Improved on Foot	Rise in Mouth Temperature, C.
1	H. N.	Thrombo-angiitis obliterans	900	3	3	3	2	0.2	7.0	6.5	++	0.0
2	L. E.	Thrombo-angiitis obliterans	900	0	0	6	2	0.4	6.2	4.7	0	0.4
3	A. S.	Thrombo-angiitis obliterans	1,000	6	0	0	0	0.0	1.8	1.6	0	0.4
4	M. G.	Thrombo-angiitis obliterans	750	0	0	6	3	0.0	5.9	3.3	+	0.4
5	A. K.	Thrombo-angiitis obliterans	1,000	0	0	6	0	1.0	2.2	2.0	0	0.2
6	O. G.	Thrombo-angiitis obliterans	1,000	1	1	5	3	0.4	6.2	6.2	+	0.4
7	M. L.	Thrombo-angiitis obliterans	800	0	0	6	0	0.0	7.2	6.1	+	0.6
8	M. O.	Thrombo-angiitis obliterans	750	2	2	4	2	0.2	4.4	1.5	+	0.0
9	A. M.	Thrombo-angiitis obliterans	750	0	0	6	3	0.0	4.4	2.6	+	0.2
10	J. G.	Thrombo-angiitis obliterans	750	1	1	2	1	1.0	7.0	1.0	+	0.4
11	L. O.	Arteriosclerosis	600	1	1	2	2	1.0	4.6	4.0	0	0.0
12	H. S.	Arteriosclerosis	800	0	0	6	3	0.0	6.5	1.8	++	0.0
13	M. B.	Arteriosclerosis	800	2	1	4	1	1.0	3.4	1.3	+	0.0
14	A. S.	Arteriosclerosis	800	0	0	6	5	0.0	4.6	3.2	++	0.4
15	A. K.	Arteriosclerosis	1,000	6	0	0	0	1.0	6.9	3.0	0	0.2
16	D. B.	Arteriosclerosis	1,000	2	2	4	1	0.2	3.2	1.7	0	0.6
17	L. S.	Arteriosclerosis	1,000	2	2	4	1	1.4	5.6	4.2	++	0.4
18	V. C.	Arteriosclerosis	750	4	4	2	1	1.4	6.0	5.6	+	0.0
19	L. R.	Raynaud's disease	900	2	2	4	3	0.8	8.6	8.2	+++	0.0
20	S. M.	Raynaud's disease	1,000	0	0	6	4	0.9	4.4	3.3	0	0.0
21	S. D.	Normal	750	0	0	6	5	0.4	3.0	0.5	+	0.0
22	J. C.	Normal	750	0	0	6	4	0.0	7.4	5.4	0	0.0
23	M. B.	Normal	1,000	0	0	6	0	0.0	2.8	0.8	0	0.4
24	L. M.	Normal	900	0	0	6	0	0.2	3.0	1.5	0	0.8
25	C. C.	Normal	750	0	0	6	0	1.2	7.4	6.8	0	0.0
26	J. H.	Normal	900	0	0	6	1	0.0	3.0	0.7	0	0.2
27	B. R.	Normal	750	0	0	6	0	0.0	2.0	1.5	+	0.4
28	S. G.	Normal	750	0	0	6	0	0.0	1.4	0.8	0	0.2

*Only the popliteal, dorsalis pedis, and posterior tibial arteries were considered here because they were in the area given diathermy. Two subjects (10 and 11) had one extremity only.

of the means by which diathermy improves the circulation and heats the tissues.

Most of the subjective effect of the diathermy was temporary and lasted from twenty-four to forty-eight hours, but after two months of treatment there was permanent improvement both subjectively and objectively in six of the eight cases of arteriosclerotic ischemia and in one of the ten cases of thrombo-angiitis obliterans. Other investigators have had similarly good results with diathermy in cases of arteriosclerosis.[4]

The reasons for the permanent improvement in the arteriosclerotic cases and the excellent immediate but poor permanent results in the cases of thrombo-angiitis obliterans may lie in the pathogenesis of the two conditions. Arteriosclerosis is a chronic degenerative condition and the narrowing of the vessels takes place over a period of years. The tissues may have become accustomed to the slow diminution of the blood supply, and slight improvement in the collateral circulation may be sufficient to restore the normal functions. Thrombo-angiitis obliterans is a more acute inflammatory disease. New vessels or parts of vessels are continually being thrombosed, resulting in a relatively sudden removal of the blood supply from the tissues. Diathermy produces excellent immediate results in this condition, probably by relieving the vasospasm, but in most cases the disease involves the primary vessels faster than the development of the collateral circulation by diathermy.

The two cases of Raynaud's disease tested showed definite immediate relief of vasospasm, but there was no permanent improvement in the condition.

CONCLUSIONS

There are not enough cases in our series to warrant a comparison between diathermy and other types of treatment in peripheral circulatory disturbances. Our results show that:

1. Diathermy locally is of definite value in the treatment of peripheral circulatory disorders, especially in arteriosclerotic ischemia without gangrene.
2. Diathermy improves the circulation largely by relieving vasospasm.

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Evaluation of Methods Used in Physical Therapy

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In the final analysis, the success or failure of any form of therapy or therapeutic agent in human medicine is gaged by its action on living patients. The evaluation of the treatment is not be to measured by the opinions of the physician but rather by the facts he can demonstrate. It is often observed that any new form of treatment which may be suggested is regarded as valuable by groups of physicians and individual patients who try it. This means that in both instances there is a psychologic factor of significant proportions. Such success as may be attained in this manner is often a manifestation of psychotherapy, involuntary in nature, rather than of actual physiologic activity of the treatment employed. Capacity for management of the psyche should be in the armamentarium of all physicians, in addition to having at his command all those drugs and physical therapeutic agents that can be proved to be of real value. It is our purpose in this paper to explain how the various devices and methods of physical therapy may be rationally evaluated. This evaluation must take into consideration the investigator, the matter to be investigated and the manner of the investigation.

The investigator is not merely a personality or a person. He must be one who by training, experience, initiative, imagination, controlled curiosity and intellectual honesty is qualified to undertake an objective examination of the matter in hand without preconceived ideas or prejudice. He must attack the problem calmly, deliberately, with a clear program based on well conceived hypothesis, and be thoroughly familiar with the work of others along the same and similar lines. This plan excludes at once the charlatan. More important, it excludes those who commonly report on the value of a form of treatment or therapeutic agent without having adequate knowledge of the method or substance employed, without supplying adequate proof of the accuracy of their diagnosis of the condition treated, and without affording a scientifically established demonstration of the value and accuracy of their conclusions by a comparison with control tests wisely chosen and properly performed.

In physical therapy it is not uncommon to find that the condition to be treated is not a well defined disease with established cause, characteristic course and clear cut pathologic alterations of form or function. When this is true, the biologic variations in manifestation are so wide that the investigation must cover an extremely large number of cases, both treated and controls, much greater than is necessary when the disturbance is in the form of a definite disease entity with a well established natural history and course.

For example, compare the treatment of some of the vague muscle and joint conditions showing no outward signs of disease, and pain the only symptom, with the treatment of a fracture similarly attended by pain. In the former case there is no objective way of determining improvement and it is difficult to know whether it is due to the physica or psychic effect of the treatment or simply a natural variation of the symptoms. In the latter case the changes following certain types of treatment can be determined objectively by various methods, and a better evaluation of the effects of the therapy can be made.

Physical therapy employs a variety of physical agents: massage, theraptutic exercise, water, air, radiations (heat, light, ultraviolet, x-rays, radium), vibrations (mechanical, sound) and electricity of various forms. All applied science is built on a groundwork of pure science, and in the same manner all the appliances of use in physical therapy have a background of knowl-

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edge in pure physics. Furthermore, rational therapeutics has at its call a certain volume of knowledge of the physiologic effects of the agents employed. Thus it is known that the physical agents just enumerated may cause certain physiologic and pathologic reactions.

The information available about these effects is much less than is true of a number of chemical substances used as drugs. For the furtherance of physical therapy it is necessary that a much larger bulk of concrete and exact information be built up than is now available. These basic facts are to be furnished chiefly by the biologist, the physiologist, the biophysicist, the chemist and the pathologist. Funds must be made available so that these potential sources of information may be activated to further and more intensive study of the fundamental action of the various physical agents. For example, it is known that within certain ranges of wavelength, ultraviolet radiation activates ergosterol in the living animal and in the test tube so that an active antirachitic substance is formed. The exact process that takes place is not clearly established. Whether it is necessary for the rays to be used in such quantity as to cause erythema in order that this chemical or physical change may take place, and what part, if any, erythema does play in the process, are all problems. What effects these rays may have directly on cells and tissues, their form and their function, require further study. It is not known exactly how activated ergosterol influences the metabolism of calcium and phosphorus to correct the changes incident to rickets. In the field of physical therapy it can only be said that ultraviolet rays prevent and cure rickets and favor the development of sound teeth and bones. Even this last phase is not incontrovertibly established: it is rather a strong presumption.

This general statement does not mean that ultraviolet rays may not have other beneficial effects nor that they have no potentialities of harm. It does mean, however, that precise information as to these other possibilities has not yet been obtained. The problems still to be solved in the fields of practice with these rays need further researches in the physics of the rays, the physiologic actions of the rays as well as the study of the rays in clinical practice. What has been said about the ultraviolet rays is applicable not only to the shorter rays of the spectrum (x-rays, grenz rays, radium) but also to the longer rays (visible, infra-red) of the spectrum. The problems are innumerable. The physiologic effects of hydrotherapy are imperfectly known and this form of treatment, excellent though it be, is largely empirical and either entirely dependent on or intimately bound up with the effects of heat. The same is true of air. Our knowledge of the exact effects and mode of action of active and passive motion, massage and rest is also incomplete. Fortunately, most of the agents are not dangerous and may be employed in human medicine without risk to the subjects of the experiment. In the case of some physical agents (e. g., ultraviolet rays) an indirect way of testing the effect on human beings or animals is possible. This is accomplished by the irradiation and activation of a substance (ergosterol), which is then administered. However, the latter in all likelihood does not act by giving off secondary ultraviolet rays to the body but rather more likely by means of other physical and chemical properties imparted by the rays to the previously inactive substance.

The study of the effects of physical therapy is of necessity largely, or partly, an experiment conducted on human beings. This experiment must be set up with all the deliberation and forethought of experiments in any line of scientific work. The evaluation of the effects of various physical agents in the treatment of certain skin diseases is not difficult, because it can be determined objectively. However, it is very difficult in the case of ill defined ailments which do not afford objective criteria for the determination of diagnosis and effect of treatment. As mentioned before, there is in human experimentation the psychic factor, which is of little and usually no significance in animal experiments. As Sollmann has said, such an experiment may utilize two methods, the first of which is the statistical and the second the comparative or blind test. In the statistical method, "alternate patients receive or do not receive the treatment." Owing to the individual variations and psychic factors, this requires an extremely large number of observations.

In the comparative or blind test, one series of patients is treated with the agent under consideration and another is treated similarly but with inactive agents, masked in such a way as to be indistinguishable both by the patient and by the experimenter. In the case of drugs, this is easily effected. In the case of some forms of physical therapy it can also be accomplished. Thus, as regards ultraviolet radiation, for example, one series of patients might be treated with rays that are unscreened or that have passed through permeable glass, and the other series with rays that have passed through glass impermeable to the ultraviolet portion of the spectrum. The latter method is often more desirable when direct treatment is being investigated. In the case of many physical agents, however, the masking of nonactive treatment and even any form of nonactive treatment is not possible. Yet, whenever practicable, it is, generally speaking, the more desirable method because it avoids favorably or unfavorably prejudiced opinions of the observer, whether those opinions are conscious or subconscious.

Owing to the limitations of this method in physical therapy, it will be necessary in many instances to fall back on the statistical method. Since this does permit of opinions on the part of the observers, the number of observations must be multiplied so as to decrease this particular factor of error. This error can be practically eliminated by objective evaluation of the effects without knowledge of the type of treatment used. Thus, one experimenter gives the treatment and another makes the observations on the patients without knowledge as to which have and which have not been treated. Strange to say, this critical part of the statistical method is rarely practiced in investigations on patients but is commonly used in experiments carried out on animals. It is the only method that is likely to lead to logical, sound and probably correct conclusions.

The main essential of any experiment in therapy is that observations with the particular form of treatment must be controlled and checked in a series of patients without the treatment. The number of observations must be so large as to minimize some of the disadvantages of random sampling. If the person who conducts the experiment is to know the nature of the method employed in each case, he must put personal opinions into the background and make his observations as objective as is humanly possible. Much can be learned from objective tests on animals, but the final test of the effects and value of all therapeutic measures designed for human beings is on the human patient and this is no less true of physical therapy than of drug therapy. The art of medicine is an essential superstructure built on the foundation of medical science, and neither the whole edifice nor any of its parts can have any escape from the inexorable laws of scientific evidence.

Knee Injuries Commonly Associated with Sports and Gymnastic Activities

Edward K. Everard*

In departments of corrective physical education and physical therapy in schools and colleges the injuries sustained in sports and gymnastic activities should have a distinct and recognized place. The treatment of such injuries would necessarily fall to the medical supervisor, but the physical therapist who has had an extensive experience with sport and gymnastic injuries in many different situations will prove a valuable assistant. He or she should certainly have acquaintance and a thorough knowledge of the types of cases discussed below. It is from this point of view that I have assembled material, diagnostic and therapeutic, concerning some of the most common of the every day physical activity mishaps: knee injuries.

Dislocation of the Patella, or Slipped Knee-Cap

Diagnosis of this condition is fairly obvious. The absence of the normal prominence in front of the knee and the presence of an abnormal lump on one side indicates the condition to be dealt with. On palpation the lump is very easily located. It can be felt to move when the quadriceps extensor contracts.

Treatment: A dislocated patella is often replaced by the patient himself, usually unconsciously. However, a physician should be called in any case.

The knee will require support in extension, as the quadriceps extensor muscle has lost its tone and has been wasting rapidly for a time. The best splint is a plaster one made by the "off" method.

Invariably there is great effusion into the knee joint, and the bruised and torn capsule causes considerable pain and discomfort for which the direct current is of great value (1—p. 374). In the later stages surging Bristow should be applied from the joint to the quadriceps extensor until the circumference of the thigh six inches above the patella is greater than that of the uninjured side. "This is the best prophylactic against recurrence." (1—p. 376.)

The usual routine of local relaxation, massage, and movement should be followed with particular attention paid to the stage of resisted movement.

Prognosis: Tone will not return to the quadriceps extensor for three or four weeks. Even though the immediate result is good the patient must be warned that all recurrent injuries to the knee-joint predispose to traumatic arthritis. Dislocation of the patella almost always shows tendency toward recurrence on account of an anatomical abnormality which is generally present in patients who suffer from this injury. The patella is placed out of line in such a way that the pull of the quadriceps acts on it at an angle instead of through a straight line and so is always tending to displace it. For this reason the advisability of a corrective operation should be seriously considered.

Synovitis with Effusion (Water On the Knee)

A simple sprain producing water on the knee with slowly increasing effusion is the case under discussion. There may be enough swelling to obliterate all the hollows around the patella. The range of painless voluntary movement is an extremely important aid to diagnosis. A patient who can obtain the full "lock" in extension has nothing seriously wrong with the internal mechanism of his knee joint. (1—p. 365.)

"If the history of the case is that of a rapidly growing effusion after a direct blow, if the knee feels hot and tense, if the patient complains of throbbing and particularly if there is any rise of temperature, an infection may have been superimposed on the strain. If the patient points out one particular spot as the principle point of pain and the origin of the swelling it is probable that the synovitis is only a complication of some other condition." (1—p. 362.)

Treatment: If synovitis is very acute the patient should rest in bed for a few days. Otherwise, if activity is necessary, it should only be permitted with the use of crutches. Hot applications to the joint, elevation of the leg and compression about the knee by snug bandages will tend to reduce the swollen condition. If effusion is quite marked and does not rapidly respond to the simple measures mentioned above, aspiration is indicated followed by local wet dressings and compression bandages. (3—p. 62.) A full routine of direct current followed by weak and strong Bristow currents is recommended. Turrell of Oxford recommends using a static machine. (1—p. 383.)

Local relaxation, massage and movement should be followed. The masseuse must avoid frictions to the joint structures and, if the poplieteal glands have been pinched, no attempt should be made to obtain full flexion or extension by forcible passive movements.

Prognosis: The patient will probably regain full movement and function in a week or two. Likewise he should be free from pain in that period. However, the knee will not have a normal appearance for many weeks.

Injury to Lateral Ligament

Both the internal and external lateral ligaments are liable to injury, but the external ligament is very rarely hurt. The treatment for both the external and internal is the same.

An acute pain on any passive movement which tends to stretch the ligament is indicative of this type of injury. On palpation the area of greatest tenderness will be found to be directly over the ligament, especially at its attachment to the tibia.

Treatment: The treatment of course applies to either the external or the internal lateral ligament. The main principle of treatment is to avoid any sort of lateral strain until the torn or stretched ligament has had time to repair. The surrounding muscles need to recover their protective tone in addition.

The patient must be put to bed and the leg splinted with a molded "off" method cast. The leg will be kept in a very slightly flexed position. (1—p. 384.) A ten day period of immobilization should follow after which the limb can be fixed by adhesive strapping. After two or three weeks the patient may be allowed to be up, at which time his leg will be in a temporary splint; and he may be permitted to move around, but only on crutches. When he begins to put weight on the injured knee a protective apparatus such as a Jones Knee Cage must be applied to the knee. This apparatus should be worn from

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six to ten weeks depending upon the returning tone of the muscles. A further support can be given by wedging the patients shoe up one-quarter of an inch on the inner side of both heel and sole. (1—p. 384.)

If the internal later ligament has been so completely ruptured that the knee permits a lateral movement while in full extension the protective apparatus will need to be worn for three to six months.

The full routine of direct current, weak and strong Bristow, should be followed exactly as in a fracture case. (1—p. 385.) It is important that the direct current application should include the popliteal space. In giving the weak and surging Bristow current, particular attention should be given to the muscles which reinforce and support the joint.

The full routine of local relaxation, massage, and movement should be followed as for a fracture. No attempt should be made to obtain full extension forcibly.

Prognosis: Prognosis is good if the full routine treatment is faithfully carried out. Any strenous activity is out of the question, at least for a few months.

Injury to the Semilunar Cartilage

The displacement of the external semilunar cartilage is a much more rare occurrence than is the displacing of the internal semilunar cartilage.* The treatment in each case however, is identical.

The displacement of a knee cartilage locks the knee for an appreciable time and is usually recognized by the patient as a projection under the skin of his knee. There will be pain when pressure is applied over the lateral ligament and a decided tenderness on the side of the patella toward the injured cartilage. If the knee is locked the practitioner, upon palpation, will find a prominence or tenderness all along the cartilage, and sometimes an unusual hollow at one point.

Treatment: Full reduction is necessary and usually may be obtained by manipulation without anaesthetic. "The patient is placed on his back while the operator stands on the injured side facing his head. As the patient flexes his hip and knee the operator grasps his foot with one hand placing the other hand on the uninjured side of the knee, rotating the leg towards the uninjured side and counting one, two, three, as he does so. At three the patient vigorously kicks his leg into extension while the operator maintains the rotation toward the uninjured side and the cartilage slips back into place." (1—p. 385.) If this manoeuver fails the knee must be flexed and extended in rotation to the uninjured side under an anaesthetic. The ability to extend the knee to a hyper-extended position will indicate a satisfactory reduction.

If it is impossible to effect a complete reduction or if the cartilage continues to slip the only satisfactory and permanent treatment is surgical removal of the cartilage.

When reduction has been accomplished the knee should be treated exactly as for a torn lateral ligament.

Prognosis: After the surgical removal of a semilunar cartilage the patient should be able to return to normal activity in four or five weeks. He may even be allowed to indulge in those sports which do not necessitate lateral strain at the knee joint, such as rowing and swimming. If the case has been treated in plaster the patient may begin to put weight on his leg at the end of a month and will probably return to real activity in six or eight weeks. However, he should undoubtedly wear some sort of a satisfactory support on the knee, at least, until the muscles and lateral ligament have been built up again to their former tone and strength.

*"Dislocation of the external semilunar cartilage is found to be much less frequent than that of the internal, some statistics giving proportion as one to twenty. Concerning the subject of dislocated cartilages of the knee, Cotton stated that there are more loose diagnoses than loose cartilages." (2—p. 212.)

Nipping of a Synovial Fringe and Loose Bodies

Although loose bodies may be felt in the course of one examination they may never be felt again, since they can easily disappear into an inaccessible part of the joint.

On the whole, x-rays are disappointing for the location of loose bodies since they give little information of real value except rather non-committal statements concerning the comparative alteration of the space between femoral condyles and the tibia. (1—p. 366.)

Treatment: The only satisfactory procedure is removal of the loose bodies by surgical means. This operation causes no damage to the knee and is especially recommended if there is frequent trapping of a loose body or a frequent nipping of a synovial fringe.

After a trapping or a nipping, splinting is not necessary. Rest in bed for a few days with the knee slightly flexed and held in that position over a small pillow is the best means of restoring the patient to normal activity. This position should not be maintained continuously, however; instead the patient will be improved by removing the pillow at intervals and slowly extending the leg.

Direct current treatment should be given at once, and as soon as effusion has been diminished by this means a moderately strong Bristow current will tone up the muscles of the leg and thigh. Diathermy is not recommended because of its tendency to set up attacks of acute pain in knees with fatty synovial fringes. (1—p. 389.)

From the outset massage and passive movements can be given profitably for the muscles of the calf, thigh and the gluteal region.

Prognosis: The results depend upon many factors —age, type, general condition, etc. In a young man the removal of a loose body may give a perfect result within ten to fourteen days. On the other hand there are types of loose bodies which may cause discomfort for many weeks.

Epiphyseal and Allied Injuries Around the Knee Joint

An injury to the lower epiphysis of the femur is a very rare and severe injury in ordinary sport. Osgood-Schlatter's disease, or separation of the tubercle of the tibia, however, is not uncommon in boys. (1—p. 373.) When the epiphysis is separated, the final locking of the knee joint in extension is impossible. When the knee is passively extended and the patient is asked to hold the limb up in that position the leg drops a little toward the thigh and there is pain over the tubercle. A lateral x-ray view will show the separated tubercle.

Treatment: Partial fixation can be obtained by applying strips of adhesive plaster from above the patella to cross each other under the tubercle. This limits the drag on the ligamentum patellae and transfers the pull to the shaft of the tibia below the attachment of the tubercle.

A direct current will diminish pain and discomfort during the first few days, and later a localized cathode current of ten to fifteen milliamperes can be applied between the strips of adhesive plaster to stimulate the bone union. (1—p. 374.) For the same purpose ultra-violet light should be applied both generally and locally. To obtain full extension Bristow currents pulling on the

quadriceps extensor are applied, but these should not be used until the doctor is satisfied that the pull on this muscle is not likely to disturb the union of the tubercle with the shaft.

The effects of massage and re-education are better obtained by a graduated return to normal activities.

Prognosis: Progress should be watched through a study of periodic X-rays. If the case is treated early and correctly, painless full extension should be obtained in about six weeks, by which time the X-ray appearance of the bone union and surrounding conditions should be greatly improved, or perfect. Active games particularly football kicking are necessarily forbidden until a satisfactory X-ray picture has been obtained.

FRACTURE OF THE PATELLA

The stellate comminuted fracture of the patella is caused by a direct blow. A similar condition may be the result of muscular violence (stumbling and attempting to recover with the knee bent). (1—p. 357.) There is less pain in the latter than in the stellate type, but a greater loss of function. Effusion and distension of the joint occur in both types of injuries. Occasionally a gap between the two parts of the patella can be seen when the knee is viewed from the side after a fracture of indirect violence.

On palpation the joint cavity appears to be full of a heavier or thicker fluid than that present in an ordinary case of water on the knee, in fact, one joint is largely filled with blood. "If effusion marks the outline of the patella, the upper and lower parts of the swelling should be gripped and steady pressure applied through the effusion until it is sufficiently displaced for the fragments to be felt. The patella which has suffered a stellate fracture has as a rule a normal outline even when the crepitus can be elicited." (2—p. 358.)

An X-ray will show the nature and extent of a transverse fracture. A good antero-posterior view will show a stellate fracture even when there is no separation. The femur, however, masks the view a good deal and the plate should therefore be studied in a proper viewing-box in a darkened room.

Treatment: Surgical interference will be necessary if the patella is broken transversely and the two parts are completely separated. Sometimes patients are not strong enough to stand operation and must be treated in full extension for twelve to fourteen weeks in order to secure firm fibrous union.

The stellate fracture, chip fracture or transverse fracture without separation can be treated by physical therapy. In such cases the knee should be put into an off-method plaster or on a back splint for fourteen days, then into a walking caliper. (1—p. 372.) If the patient must be active it is possible to use the walking caliper from the beginning. As far as electro-therapeutics are concerned the full routine of direct current, weak and strong Bristow may be used. (1—p. 372.)

For physical therapeutics, the full routine of local relaxation, massage and movement should be followed, and, in addition fractional passive movements should be given from the outset. (1—p. 372.) It is most important to keep the skin over the patella healthy and to move the bone on the condyles by gentle passive movements—not frictional.

Prognosis: The duration of disability varies according to the type of fracture. A transverse fracture treated by operation usually takes three to four months to recover completely. The same fracture without operation generally takes four to six months. A stellate fracture should heal in six to eight weeks.

FRACTURE INTO THE KNEE JOINT

A fall on the knee may split the condyle and open up the joint. This injury is largely attributable to the strain caused by the over stretching of the ligaments involved in such an action. (1—p. 357.) A less severe fracture into the synovial cavity is from a blow or impact on the knee. These injuries are always severe and are associated with short stabbing pains.

The shape of the knee is abnormal because the capsule is distended with effusion, and in the severe type, when the condyles are split, the deformity is even greater, largely because of a widening of the articular surfaces and upsetting of the mechanism of the joint. On palpation the knee feels "mushy" and there is usually some evidence of hæmorrhage into the surrounding tissues. The leg may be shortened, especially if a condyle has been broken. An X-ray is not only advisable, but necessary.

Treatment: The treatment in this case is by the use of rather complicated splints. At the start of convalescense the use of a caliper brace extension is strongly recommended.

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Convention

June 13, 14, 15, 16, 1934! Members of the American Physiotherapy Association mark these dates with red ink on your calendars. They are the dates of our National Convention, which this year will be held in Cleveland, Ohio. Many important questions will come before this Convention and, although the delegates will do their part, we need the counsel, advice, and support of all our members.

The program is not yet ready to appear in print as some of our prospective speakers are still to be heard from. In the sessions of the first day there will be a change from previous years, namely, the opening business meeting is scheduled for 9:00 A. M. on June 13th. This is of importance to all delegates. At 4:00 P. M. a social tea will be served following the delightful precedent set by former conventions.

One of the interesting features on the program is a visit to Nela Park, the General Electric "House of Magic" in Cleveland. With the General Electric Magicians as our guides and interpreters, we are assured of an enjoyable evening.

At as early a date as possible the program, together with other convention literature, will be mailed to the members of the American Physiotherapy Association.

Hotel Cleveland, which will be our headquarters on June 13, 14, 15 and 16, is located on Public Square in Cleveland and adjoins the Cleveland Terminal. It offers every convenience and the rates are moderate, ranging from $2.50 a day up, for room and bath. Early reservations are desirable because the American Medical Association will meet in Cleveland at the same time.

Cleveland, being within a short distance from the East and the West, and having accommodations for travel by air, water, rail, and highway, has an ideal location as a city in which to convene.

The Cleveland Chapter welcomes you and looks forward with great pleasure to being hostess to the American Physiotherapy Association.

Cleveland Chapter.

Why Raise the Dues!

At the annual meeting in Chicago last June, the question of an increase in dues was discussed. The delegates came instructed by the groups they represented to express the opinions of their respective groups. Some reported opposition to the plan; others did not. But in the returns from the Chapters during the year, it is gratifying to report that the majority are now approving the raise in dues.

Yet though the matter has been discussed in the Chapters, a little review of the situation may not be amiss, especially since the large body of members-at-large do not have the advantage of chapter discussion. No one, except those who have had experience in much service, is realy enthusiastic over the idea of paying more dues, of course. No one is ever enthusiastic over having to pay more for something. That is logical, and to a certain extent, understandable. But there is logic on the other side, as well. Let us look at this thing fairly, and fairly make an answer to ourselves and to our organization.

Last year the secretary was asked to keep account of the time she spent upon the job. She reported that she kept account of only such time as amounted into an appreciable number of minutes. If she retired to her workroom for the evening, or for an hour perhaps, she jotted down the time; but if she took five or ten or fifteen minutes to dash off a letter or make some telephone calls, she ignored those minutes. Yet considering only the major amounts of time, she spent on an average of forty-four hours a month working for The American Physiotherapy Association—four hours over the NRA week, is it not? And this but one office! There are besides: the president, vice-presidents, treasurer (many hours does she spend over books and files), committee members, the Review staff, and others. The total number of hours devoted to detail work alone would keep one person busy full time; yet these people who serve as officers and on committees are all employed in regular positions, also. The time they give to the work of the Association must be their evenings, their holidays, and their Sundays.

Well may the question be asked—Is it fair to expect a few people to shoulder, not only the responsibility they

must assume for a period of two years or more, but also the detail work connected with the offices? Not everyone can help—even if everyone were willing!—for much of this detail work cannot be peddled out in small lots; it must be done by those familiar with it. Then too, many of the members are too scattered to take only a small part of the work. Yet, because of the nature of the work which demands certain knowledge of it, can we in justice ask a few people to give as much as forty-four hours a month to an extra job?

Our organization is growing. For this we are grateful, and for this we may well be thankful to those who have labored in the past. But a growing organization means more responsibilities, and more duties and labor. The Association has now arrived at the complex state of administration in which a paid secretary will not only afford relief to the overburdened workers, but will be an asset in efficiency. As faithful as the officers and committee members are, as already stated, they do have bread and butter jobs to which they must devote themselves, and sometimes they cannot get to Association business as promptly as they would like.

The question may be asked—Is this the time to talk of raising dues when folks are out of work and when those who have work have had their incomes reduced? What more opportune time! What greater need of the Association! Were the land flowing with milk and honey, with surplus jobs and high salaries, what then would there be to worry about? Then, more truly, could we sit comfortably back and merely enjoy our Association. It is now that we need it more than ever before, and perhaps more than we ever shall again in our generation. We need the professional background, whether we are out of work or fortunate enough to have it. Our profession is our bread—and we hope some relish, too. No better investment can we make in these somewhat unsteady days, than a few extra dollars paid into an organization which can help us to hold our respect, and which can gain for us the respect which in turn may mean a job, or a better one.

Notice

The National Publicity Committee is anxious to compile a list of all Motion Pictures made by members of the American Physiotherapy Association. Many of our members are doing outstanding work in some phase or another of Physical Therapy and have made permanent record of it. If anyone knows of such films which could be made available, we would appreciate knowing about them, for it is the object of this list to make possible the loan of the films to Chapters wishing to use them for programs.

Will you make it your personal duty to send the title of film, a short synopsis, and the name and address of the owner, to the Chairman of Publicity?

Margaret A. Wallace, 415 Carlson Bldg., Evanston, Ill.

Exhibits for the Convention

The Committee on Exhibits proposes to have a competition on Chapter exhibits at the convention—also one for members at large. Since the announcement in the last REVIEW one new member has shown the proper spirit by offering to send pictures of her very new department. We can have all the space we need, so here's the opportunity, Chapters and members, to show us your pet schemes and devices for treatment, pictures, etc. Besides helping to make the convention more interesting you may win a prize or honorable mention.

It is impossible to write to all the members-at-large so please keep this announcement in mind.

If material is to be mailed, please send it to Hotel Cleveland, care of American Physiotherapy Association, 13th Annual Convention, to be received by June 12th at the latest.

Cleveland Chapter.

Help!

Does anyone have the second number of the old Review—Volume 1, Number 2? If you have, would you be generous enough to part with it so that we might have a complete and perfect volume of our journal in the editorial files? It is the only number missing, and if you can supply it, your gift will be a true act of charity.

Examination Offered

An examination will be offered in May (exact date to be announced later), to those desiring membership in the American Physiotherapy Association, but whose training or prerequisites do not meet the constitutional requirements. Application may be made to the nearest chapter or to Miss Marien Swezey, Gary Hospital, Gary, Ind.

All applications must be finally approved by the National Executive Committee. Fee of ten dollars must accompany application. Fee will be returned if application is not accepted, or if for any reason applicant is unable to take the examination, providing the Executive Committee is notified at least one week before the date of the examination.

It has been said that "Man cannot live by bread alone." Neither can an organization live without publicity, or as the news editors prefer to call it. "News items." So, let us see to it that there is always an advance notice of our meetings in the local newspapers, and if possible the Medical Bulletins. Also, do you invite the doctors to your meetings not only to speak, but to be your guests? *Chicago Chapter.*

Chapter News Items

Chicago Chapter

Regular meeting—Oct. 4, 1933. Dinner and business. Chapter discussed need for publicity, raising of National dues, lengthening of at least two of the terms of office.

Regular meeting—Dec. 6, 1933. Dinner and program. Miss Gudrin Carlson, for five years Trades Commissioner to Norway gave talk. Chapter voted to raise National dues.

Special meeting—Jan. 14, 1934. Social tea given by Executive Committee.

Regular meeting—Feb. 7, 1934. Dinner and program. Dr. Benjamin Boshes of Northwestern University talked on "Muscular Dystrophy."

Cleveland Chapter

Regular meeting Feb. 27, 1934. Program—Illustrated talk on a Home for Cripples in Norway and Denmark. Business—Preparations were made for the coming convention.

Minnesota Chapter

Regular meeting—Oct. 4, 1933. Chapter voted to have one meeting a month with two dinner meetings during year. Chapter discussed possibilities of a course in Anatomy at the University of Minnesota for the members.

Regular meeting—Nov. 4, 1933. Program: Lecture by Dr. Evans on Neurological Aspect of Poliomyelitis. Business: Discussion in regard to course of lectures by Dr. Evans to be given at our monthly meetings.

Regular meeting—Dec. 9, 1933. Program: Lecture by Dr. Evans on Spastic Paralysis. Business: Chapter voted to pay for lectures out of treasury.

Regular meeting—Jan. 13, 1934. Program: Lecture by Dr. Evans on Low Back Injuries.

Regular meeting—Feb. 3, 1934. Program: Lecture by Dr. Evans on Ischemic Paralysis.

New Jersey Chapter

The monthly meetings, with the exception of the last, a social one, are usually held with the New York Chapter. New Jersey is responsible for the programs in November, January, and March.

Meeting in New York—October—Regular dinner meeting to begin the year, with the advisory councils of both the New York and the New Jersey Chapters as guests. After dinner there were informal speeches and discussion of such topics as Legislation affecting Physiotherapy, Our Relations with other Groups of Professionally Trained People, and Physiotherapy in Other Countries. A visiting doctor from Australia told of his reecnt sojourn in England, and the work being done there.

Meeting in Newark—November—Lecture by Dr. E. C. Stanaback, pediatrist, with slides, to illustrate how common non-operative conditions of feet are taken care of by this branch of therapy. Paper on "Weak Foot vs. Congenital Low Arch"—Miss O. Madeline Larson, a student in the Physical Education Department of Teachers College, Columbia.

Meeting in New York—December—Lecture, Dr. Fred Albee, at the New York Orthopedic Hospital. Subject: *Myofascitis.*

Meeting in Newark—January—Subject "Nutrition and Disease." Dr. Walter Russell, bio-chemist at the State Agricultural Experiment Station in New Brunswick gave the latest information about experiments on vitamins, and a comprehensive outline of what bio-chemists have learned about the outstanding dietary deficiencies.

Meeting in New York—February—Program: "Active Motion vs. Passive in Treatment of Injury," by Dr. William Healey, Professor of Surgery, Polyclinic Hospital. "Physical Therapy in Europe" (lantern slides and films). Dr. Richard Kovacs, Professor of Physical Therapy, Polyclinic. Inspection of the new Physical Therapy Department of the Polyclinic Hospital.

Proposed meeting in Newark in March. Informal talk by Dr. George Deaver of New York University on the "future" for the present members of the American Physiotherapy Association.

Business—It was voted to cooperate with the New York Chapter so that each may have the use of the other's circulating library. Proposed changes in Constitution have been discussed and a committee appointed to report the general attitude to the national executive committee.

Northern California Chapter

Course of six lectures on Muscle Function started Nov. 14. Lecture given by Dr. John B. Saunders, M. D., Ch. B., F. R. C. S. (University of Edinburgh), assistant professor of anatomy at the University of California Medical School.

These lectures were also open to members of the Physical Education Departments of neighboring colleges and universities. Lectures exceedingly interesting.

Oregon Chapter

The Oregon Chapter meets regularly the second Tuesday of each month.

On January 9, 1934, Dr. Leavitt of the New York Orthopedic Hospital gave an informal talk on the activities of the Out-Patient Clinic of the New York Orthopedic Hospital and an interesting description of the new method of spinal fusion used at that institution.

Miss Cora Howes, former president of the Oregon Chapter, has been transferred to the Hines Hospital in Illinois.

Southern California Chapter

Regular meeting—Oct. 7, 1933. Program: Dr. P. J. Walker gave an outline on the present methods of treating arthritis.

Regular meeting—Dec. 6, 1933. Program: Dr. Steele Stewart gave an illustrated talk on a new operation for congenital dislocation of the hip.

Regular meeting—Feb. 14, 1934. Program: Dr. Harold Crowe talked on "Physiotherapy Around the Northern Hemisphere."

ABSTRACTS

John S. Coulter, M. D.

MEDICAL AND NURSING PERSONNEL OF THE PHYSICAL THERAPY DEPARTMENT

John S. Coulter, M. D., D.T.M., in Hosp. Progr., XIV:8:312, Aug. 1933.

In the demonstration booth of the Council on Physical Therapy at the annual meeting of the American Medical Association there is displayed a poster reading: "Do not forget the patient as a whole in your effort to treat the part." The point of view in the treatment of the sick has changed. Advances in medical science have compelled fuller recognition of the patient as a whole, with commensurately less emphasis upon the treatment of individual organs or parts. The present era is one of physiologic medicine and surgery. The prevention of abnormal states and the restoration of function constitute the modern ideal of therapy. This ideal can be achieved only when the interest of the physician in his patient begins in the consideration of prevention and extends to the time when the patient returns to his work.

A Physician Necessary

Therefore the most essential requirement for a physical therapy department is to have a qualified physician in charge. Physical therapy has suffered from the relative paucity of precise data concerning the rationale and practice of the physical agents employed. In a recent article of the Council on Physical Therapy it is stated that in the final analysis, the success or failure of any form of therapy or therapeutic agent in human medicine is gauged by its action on living patients. The evaluation of the treatment is not to be measured by the opinions of the physician but rather by the facts he can demonstrate. The study of the effects of physical therapy is of necessity largely, or partly, an experiment conducted on human beings. This experiment must be set up with all the deliberation and forethought of experiments in any line of scientific work. The main essential of any experiment in therapy is that observations with the particular form of treatment must be controlled and checked in a series of patients without the treatment. The number of observations must be so large as to minimize some of the disadvantages of random sampling. If the person who conducts the experiment is to know the nature of the method employed in each case, he must put personal opinions into the background and make his observations as objective as is humanly possible. Much can be learned from objective tests on animals, but the final test of the effects and value of all therapeutic measures designed for human beings is on the human patient and this is no less true of physical therapy than of drug therapy.

A Neglected Opportunity

The duties of the personnel for this department have been given by the author in another article. In the consideration of the personnel for this department another viewpoint is necessary. To fulfill the whole purpose of modern medicine physical therapy departments must include preventive as well as remedial measures. The general public has come to recognize the supreme importance of physical activity, fresh air, and natural or artificial ultraviolet radiation in safeguarding health. Through articles in lay magazines, the public is being educated by a small number of the profession to demand a positive view of health on the part of the medical profession.

Many physicians are referring cases to the so-called physical culturists, the health clubs, or the athletic departments of clubs, for exercise and ultraviolet radiation. Most of these patients should be referred to a properly equipped hospital physical therapy department for treatment under the close supervision of a physician.

Proper Supervision

The same arguments may be advanced for ultraviolet radiation. The public has been educated as to its value. It has no dangers if properly used, and therefore, surely it can be better employed in a hospital physical therapy department supervised by a physician and where the treatments are given by technicians trained to look for signs of an overdose. Ultraviolet radiation is being given for health preservation. Smiley and Maughn, at Cornell, have continued to report beneficial results in cold prevention, and while the value of ultraviolet radiation in this connection has not been confirmed or explained, it is being used by the public. Again, this could be far better given in a hospital physical therapy department than at home or in some club. There are some contra-indications to the use of ultraviolet, and these contra-indications would be recognized in the physical therapy department of a hospital, whereas they probably would not be in a club solarium. In the interest of public health, this service should be made available by the hospitals of this country. The increased outpatient business would make possible the reduction of the fee for prophylactic irradiation to an amount that is within the means of most patients.

In conclusion I wish again to emphasize that if a hospital physical therapy department is to be successful financially and if it is to meet the ideal of present-day therapy, it must be under the supervision of a physician, and the treatments administered by a properly trained technician, preferably a nurse with a special education in addition to her nurse's training.

PHYSICAL THERAPY IN CALIFORNIA

A Special Committee Report, Calif. & West. Med., XXXIX:5:297, November, 1933.

(A Special Committee on Physiotherapy was appointed by the Council of the California Medical Association in September, 1932. The committee consisted of Doctors Charles L. Lowman, Howard Naffziger, Rodney F. Atsatt, H. Leslie Langnecker, and John Severy Hibben (Chairman).

Plans for the Future

Our first step will be to again contact the medical societies which have not appointed committees, and to cooperate with such committees as have been appointed. Cooperation would include:

1. Making a more detailed survey of hospitals and institutions practicing physical therapy; under whose direction the work is being carried on; qualifications of technicians and physicians; equipment; and details of any graduate or post-graduate instruction given.
2. To promote the teaching of physical therapy to graduates and undergraduates in medical schools and hospitals.
3. To ascertain the number of regular and irregular establishments offering some form of physical therapy treatment to the public, and under what authority they operate.
4. To encourage the presentation of papers on physical therapy subjects at meetings of the state, county and city medical societies, and at hospital staff meetings.
5. To see that physical therapy literature and books are obtainable in medical and hospital libraries.

Comment

There are only two state committees in physical therapy in the whole United States—one on the Eastern Coast, the other on the Pacific Coast. How can physical therapy get adequate recognition unless more state committees are formed? It would aid greatly if at least one-half of the states had well organized, functioning committees. As soon as the medical profession understands that we are not merely trying to promote physical therapy, but are seeking to regulate its practice and turn the tide into legitimate channels, there should be no difficulty getting committees organized. Then on the day before each annual meeting of the various state medical societies, and while working in conjunction with the plan of the American Congress of Physical Therapy, we could have presented both constructive and instructive physical therapy programs.

EDUCATIONAL PREPARATION OF THE PHYSICAL THERAPY TECHNICIAN

Alexander J. Kotkis, M. D., in Hospital Progress, XIV:11:425, November, 1933.

The Technicians Qualifications

It is a strongly debated and no less equally delicate question as to just what background the intended technician should have. Is it preferable that she be a registered trained nurse, or would it be more desirable that this person be a graduate of a recognized school of physical education? Both plans have worthy adherents, and strong arguments. Personally, I must cast my lot with the trained nurse, because the technician-in-charge must know nursing routine, especially, that of general hospital. Nevertheless, it is a common opinion that the qualifications of the ideal technician should be grouped under two headings: (1) Natural attainments, such as diligence, a pleasing personality, and a charming disposition, (2) Educational qualifications.

In no other field of medical endeavor is so much therapeutic responsibility placed on a technician as is placed in the ministrations of a physical therapy technician. Even with competent medical supervision, the success of a physical therapy department still depends upon the personality and the qualifications of the technician-in-charge. A pleasing personality and a charming disposition will obtain the best cooperation from the patients, while well-balanced educational qualifications will command the respect of the staff.

The St. Louis University School of Nursing offers to the Sisters of the Catholic Hospital Association two courses in physical therapy:

1. A four-year course with a major in physical therapy, leads to a degree of B. S. in physical therapy.
2. A two-year course for graduates in nursing leading to a degree of B. S. in nursing with a major in physical therapy technology.

All applicants must be graduates from approved high schools. St. Louis Universitv feels that in offering these longer courses, it will best fit students to cope intelligently with the responsibilities of physical therapy.

TREATMENT AND CONTROL OF ESSENTIAL HYPERTENSION

A New Therapeutic Measure

H. O. Gunewardene, M. B., B. S., Lond., D. M. R. E. Cantab. Late Clinical Assistant, National Hospital for Diseases of the Heart, London. In British M. J. No. 3806, p. 1114, Dec. 16, 1934.

In 1917 Cyriax reported good results in cases of moderately high blood pressure obtained by what he described as "mobilization of the spinal column," by which he meant active and passive movements of the vetebral joints, and passive manipulations, vibrations, petrissage, etc., of the erector spinae muscles. His explanation of raised pressure was, apparently, that congestion of these parts led to irritative states of the erector spinae, setting up a series of sensory stimuli to the posterior spinal nerves, which in turn gave rise to a series of pressor effects. Whatever the explanation, his figures seemed to show a definite diminution of the blood pressure in his patients.

Although unwilling to accept the theory on which the treatment was based, I ventured to modify his method by substituting electrical stimulation of the skeletal muscles and submitting patients with high grades of pressure to treatment on these lines. As a preliminary the patients were tested to see what effect the resulting muscular contractions had on the pulse rate, particularly as some of them were on the verge of cardiac failure, a few actually exhibiting edema of the angles and a more than moderate enlargement of the heart. In every case the pulse rate dropped, sometimes by eight beats to the minute; in a few it remained stationary; in none did it rise. It was argued, therefore, that the method of treatment, instead of throwing a burden on the heart, actually relieved it, and the treatment was carried out with greater zest.

Discussion

Prior to accepting this method of treatment I had tried diathermy in a large number of cases of hypertension. I was never able to convince myself that pressure was reduced to an extent which could not be explained by the simultaneously ordered rest, in spite of Clifford Allbutt's statement nine years ago that arsonvalization by the autocondensation method is the most valuable immediate aid we possess for hyperpiesia." But it was always strikingly evident that this treatment made the patients feel better, particularly when the kidneys appeared to be involved. They nearly always stated they were much better. With the diathermy I often combined radiant heat, particularly in renal cases. The striking reduction of pressure obtained in non-renal cases in the above series would therefore appear to be due to the mobilization of the muscles in the manner described.

The results recorded above indicate:

That in some cases of hyperpiesia the blood pressure drops to low limits, even to normal figures, without

rest or medicinal aid; there is also relief from distressing symptoms.

That in other cases the patients are relieved of their symptoms and proclaim that they feel better, but that pressures will not fall. These cases show impaired renal function as gauged by the urea concentration test.

That the heart enlarged as a result of the strain of hypertension gets astonishingly smaller with the fall of pressure.

It is difficult to give an explanation of the mechanism by which the reduction of pressure is brought about. I was encouraged to try it by my belief that sedentary occupations or lack of sufficient exercise play an important part in the etiology of essential hypertension, and, if I may be allowed to put it figuratively, that the rusty arterioles and capillaries of sluggish muscles were a cause of elevated pressure. It was found in the series that when an appreciable degree of diminution of pressure was not obtained the urea concentration test showed impaired renal efficiency.

All the patients were treated in hospital. The machine used was the ordinary pantostat—the faradic current—with a Lewis Jones interrupter in circuit to prevent irregular contractions and uneven, unpleasant shocks. Ordinary batteries have not so far been used, but there is no reason why any method of stimulation should not answer, so long as sudden shocks and irregular contractions are avoided. The Smart-Bristow coil ought to prove useful. In the absence of electricity, massage would, I imagine, answer; but I am not in a position to vouch for good results. When pressures drop low as a result of treatment—namely, below a diastolic pressure of 110—the patients are taught exercises with which the muscles may be kept in action—particularly the trunk muscles—or advice is given that mild exercises may be resorted to. The patient should be carefully watched, particularly when cardiac enlargement and symptoms are present, or the doctor may one day be called upon to face a charge of "electrocution" when death due to heart failure is attributed to electrical shock. I have particularly refrained from using subsidiary measures in order to estabish the efficacy of this method of treatment, but I am of thê belief that therapeutic doses of the drugs ordinarily used (not patent medicines) would prove very useful in maintaining the good results obtained, particularly in those cases in which the blood pressures have not fallen too near normal limits. To establish that the combined measures will give more satisfactory results than those already obtained must remain part of the program of the future.

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Book Review

Report to the United States Government on Tuberculosis, with some Therapeutic and Prophylactic Suggestions, by S. Adolphus Knopf, M. D. Pages 59 with 54 illustrations. Price $1.15, National Tuberculosis Assn., 450 Seventh Ave., N. Y. City. 1933.

This book is of interest to every physical therapy technician treating tuberculosis. In the chapter on preparing the tuberculous patient for work, the author emphasizes the value of massage, hydrotherapy, and respiratory therapy for these cases. He believes that before, or concomitant with graduated walks, the patient should have a thorough daily general massage. The former patient often develops a tendency to catching so-called "colds," and the author is convinced that a course of judiciously and carefully applied hydrotherapy is far superior to any other prophylatic agency.

Concerning respiratory therapy, Knopf says it must be stated that as in sanatorium treatment, so in post-sanatorium treatment, deep thoracic exercises are not indicated as long as the tuberculous process in the lungs is more or less active. On the contrary, the patient is told to breathe quietly and avoid deep respiratory efforts. If, however, there is an arrest, an apparent arrest, or slight activity, for a patient who has had an invasion limited to the upper and right middle lobes, a method of controlled diaphragmatic respiration is an ideal way of giving the formerly invaded portions of the lungs, if not absolute, at least relative rest. There are three chapters devoted to this respiratory therapy giving the technic in detail.

There are also two chapters on the prevention of tuberculosis in children by breathing exercises and general hygiene. It is therefore believed that this book carries a practical message of value to the physical therapist.

Reviewed by John S. Coulter, M.D.

The Cleveland Committee on Exhibits makes an appeal to the chapters for material for our exhibition room. We want to make this feature of the Convention in June of special interest professionally. Therefore, if any of you have photographs showing any phase of your work, any special apparatus that you use, children's educational toys, or anything in which you are interested and which has educational or therapeutic value, we would welcome your cooperation. A letter will be sent to each chapter later on, but meanwhile put on your thinking caps. We have arranged for a room for exhibits, so we shall have adequate space. *Cleveland Chapter.*

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